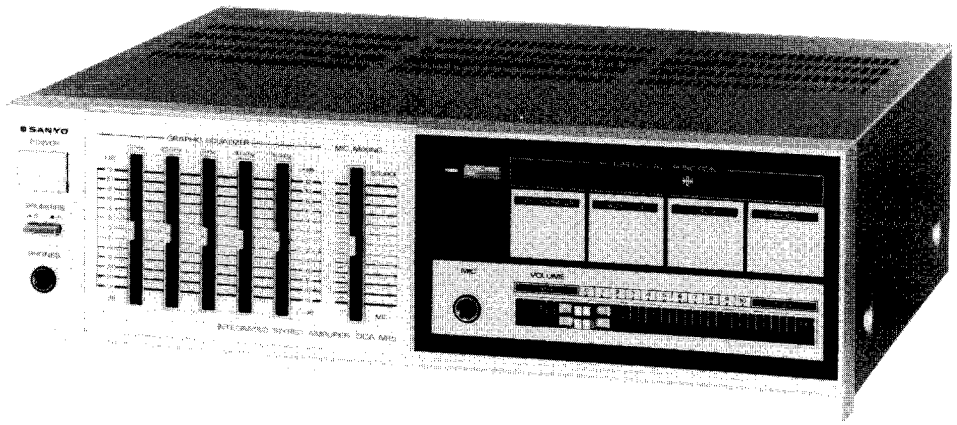
SERVICE MANUAL

SANYO

INTEGRATED STEREO AMPLIFIER

DCA M15 (EUROPE)



NOTE:
The photo on the cover shows the unit with a "SILVER" front panel. The "BLUE" version is identical in all respects.

SPECIFICATIONS

NOTE:
The below mentioned specifications are mainly based on the IHF measurements standard.
They can therefore not be compared directly with specifications based on the DIN standard or other standards.

POWER AMPLIFIER SECTION

Minimum RMS sine wave power per channel, no more than stated distortion and with 8-ohm load at 1 kHz (DIN)	45 Watts
Total Harmonic Distortion	0.09 %
I.M. Distortion	0.09 %
Speaker Damping	> 25

PREAMPLIFIER SECTION

Frequency Response	
Phono (RIAA)	±0.5 dB
Aux (±1.0 dB)	20 Hz – 20 kHz
Microphone (±3 dB)	70 Hz – 4.5 kHz
Input Sensitivity/Impedance	
Phono	2.5 mV/50 kohms
Tuner	150 mV/50 kohms
Aux	150 mV/50 kohms
Tape	150 mV/50 kohms
Microphone	1.5 mV/7 kohms
Phono Max. Input Capability	120 mV
Graphic Equalizer	
50 Hz	±12 dB
250 Hz	±12 dB
1 kHz	±12 dB
4.5 kHz	±12 dB
15 kHz	±12 dB
Hum and Noise (IHF Short Circuit, A Network)	
Phono	72 dB
Tuner	80 dB
Aux	80 dB
Tape	80 dB
Microphone	64 dB

GENERAL

Power Requirements	AC: 110/220V, 50 Hz
Power Consumption	296 W
Dimensions (W x H x D)	335 x 108 x 257 mm
Weight (approx.)	5 kg

—Specifications are subject to change without notice.—

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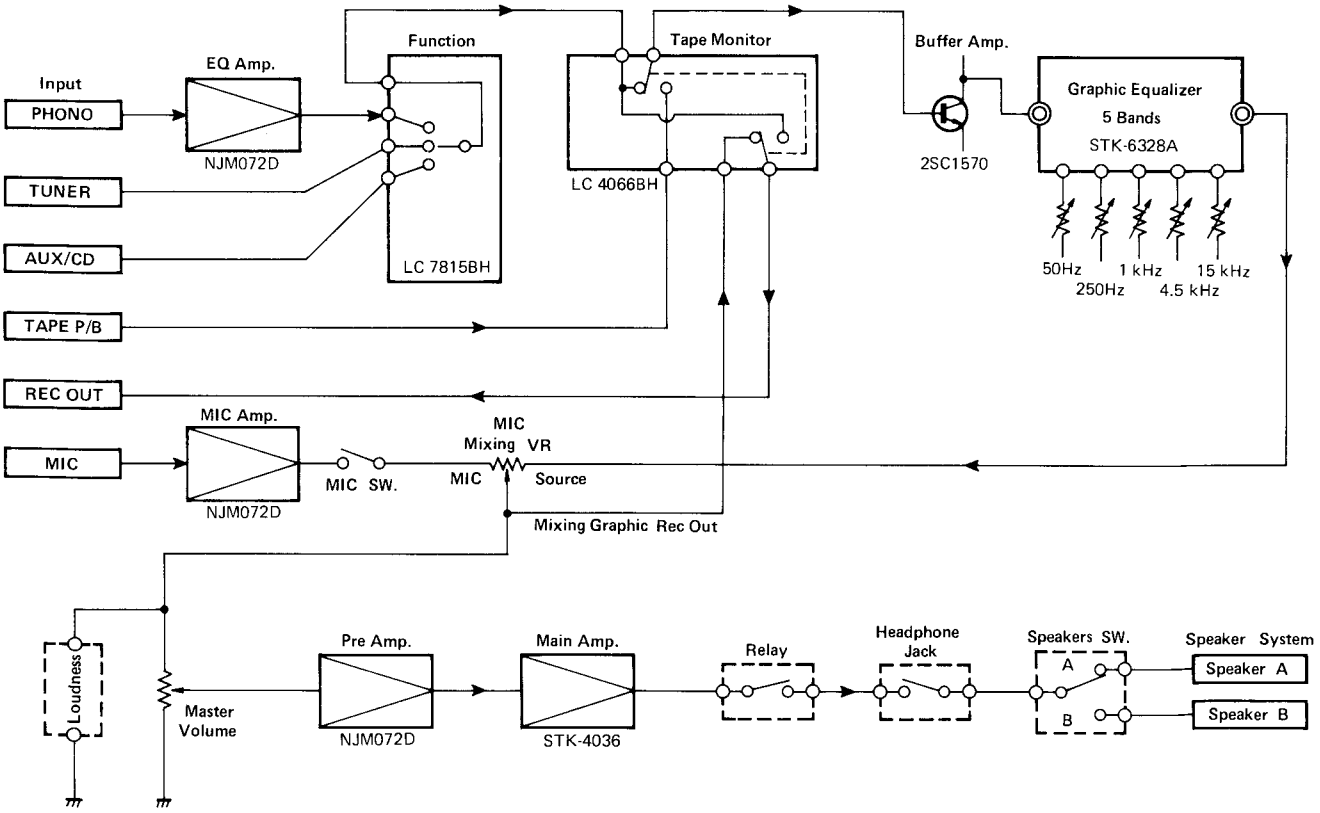
FUNCTIONAL BLOCK DIAGRAM



RECOMMENDED TEST EQUIPMENTS

The following test equipments are recommended to completely test and align the Amplifier:

- Line Voltage Isolation Transformer
- AC DC Multimeter.
- Accurately Calibrated AC Voltmeter.
- Oscilloscope (Flat to 100 kHz Minimum)
- Low-Distortion Audio Sine-Wave Generator
- Harmonic Distortion Analyzer
- Two (2) Load Resistors 8-ohms, 250 Watts (Minimum Rating)

HARMONIC DISTORTION TEST

CAUTION: Limit the following tests to no more than ten minutes each. Use 8-ohm resistors, with a minimum power rating of 250 watts when connecting a load across the SPEAKERS terminal.

CONTROL SETTINGS:

Unplug the AC power cord and set the front panel controls as follows:

- GRAPHIC EQUIALIZER controls to center positions.
- MIC MIXING controls to SOURCE position.
- POWER switch to OFF
- SPEAKERS switch to SYSTEM-B
- FUNCTION switch to AUX
- TAPE MONITOR switch to SOURCE
- VOLUME control to MINIMUM position
- LEFT CHANNEL DRIVEN

ONE CHANNEL DRIVEN:

1) Connect a low distortion audio generator to LEFT AUX IN jack. Set generator frequency to 1 kHz and output to minimum.

2) Connect an 8-ohm load resistor between SPEAKERS SYSTEM-A LEFT and COM terminals. Connect a Harmonic Distortion Analyzer and an AC VTVM in parallel across the 8-ohm load.

3) Connect the AC power cord and set SPEAKERS switch to SYSTEM-A. Turn VOLUME control to MAX.

4) Increase generator output for 45 Watts RMS (18.9 volts across the 8-ohm load). Harmonic Distortion Analyzer should measure 0.09 % distortion or less.

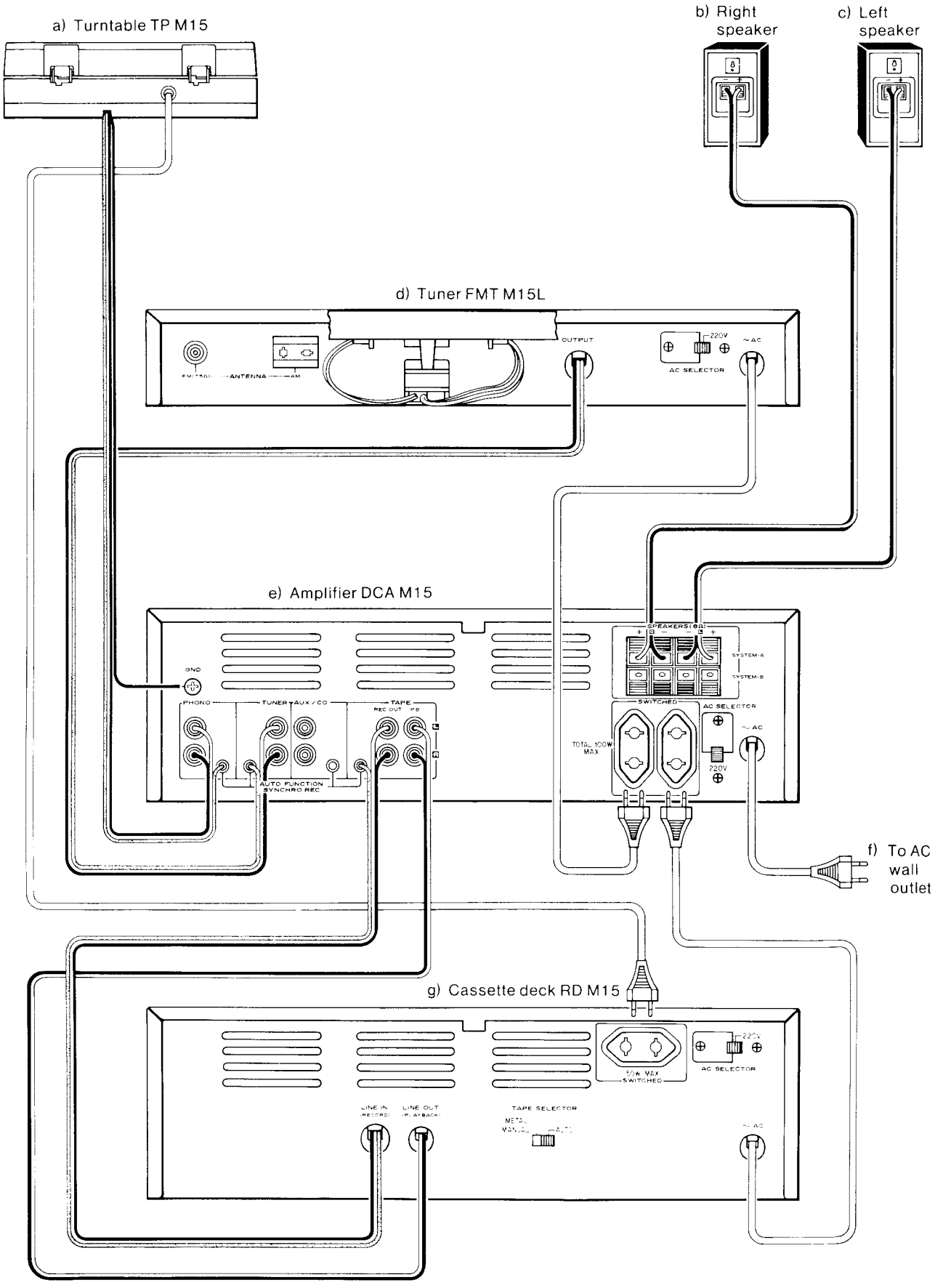
5) Repeat steps 1 through 4 for RIGHT CHANNEL.

BOTH CHANNELS DRIVEN

Connect 8-ohm load resistors across LEFT and RIGHT SPEAKERS SYSTEM-A terminals. Adjust generator output and "VOLUME" control for 45 Watts at Left and Right Channels (18.9 volts across the 8-ohm loads). Harmonic Distortion Analyzer should measure 0.09 % distortion or less at each channel.

CAUTION: This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistor equipment and printed circuitry.

CONNECTING DIAGRAM



DIRECT CALL FUNCTION & SYNCHRO RECORDING

When the amplifier DCA M15 is used in combination with the optionally available tuner FMT M15L, turntable TP M15 and cassette deck RD M15, the direct call (automatic selection) function and disc synchro (simultaneous) recording function can be used to full advantage.

DIRECT CALL FUNCTION:

Simply by pressing the desired preset station button on the tuner for radio reception, by pressing the START button on the turntable to listen to a record or by pressing the PLAY button on the cassette deck for tape playback, the amplifier's FUNCTION button and TAPE MONITOR button are automatically set to broadcast reception, record play or tape playback, respectively. In other words, it is not necessary to set the position of the FUNCTION button and TAPE MONITOR button each and every time.

- When the tuner's preset station button or turntable's START button is pressed while you are listening to a tape, the broadcast reception or record play mode is established. Simultaneously, the cassette deck's PLAY button is released, the PLAY indicator goes off and the tape stops.
- When the tuner's preset station button or cassette deck's PLAY button is pressed while you are listening to a record, the broadcast reception or tape play mode is established. Simultaneously, the turntable's tone arm rises from the record " ⌐ " appears in the operation display window, the tone arm automatically returns to the arm rest and the platter stops rotating.

SYNCHRO RECORDING:

When music from the records is being recorded, the cassette deck's PAUSE button and SPACE PAUSE button are released or activated in synchronization with the turntable's tone arm operation.

- When the turntable's START button is pressed and the tone arm lowered onto the record, the cassette deck's PAUSE button is released and the deck is set to the recording mode at the same time.
- When the turntable's CUEING button is pressed and the tone arm rises from the record, the cassette deck's SPACE PAUSE button is activated at the same time, a silent space (unrecorded portion) of approximately 4 seconds is created and the pause mode is established. When the CUEING button is pressed again and the tone arm descends onto the record, the PAUSE button is simultaneously released and the deck is returned to the recording mode.
- When the turntable's REJECT button is pressed and the tone arm rises from record, the cassette deck's SPACE PAUSE button is simultaneously activated, a silent space of approximately 4 seconds is created and the deck is set to the pause mode. The tone arm returns to the arm rest and platter stops rotating. Operation is the same for auto return.

TROUBLE SHOOTING GUIDE

BEFORE REPAIR WORK

Check the trouble symptoms and perform the repair work after the following remedies.

1. Check that the AUTO FUNCTION/SYNCHRO REC plug, the pin plug, and the ground wire of the player are securely inserted and connected from each unit to the amplifier.

2-1 Disconnect all the wires except the AUTO FUNCTION/SYNCHRO REC cord from the amplifier and check if each unit functions normally. If no abnormality appears, insert and connect the wires securely.

2-2 Alternately disconnect the cords of each unit and check the performance of the amplifier.

3-1 Check if the amplifier functions normally when any abnormal unit is not connected to the amplifier (Normal units should be connected.).

3-2 If no abnormality appears on the amplifier, check the unit not connected to the amplifier and repair it.

3-3 If some abnormality still appears on the amplifier, follow the procedures as described below.

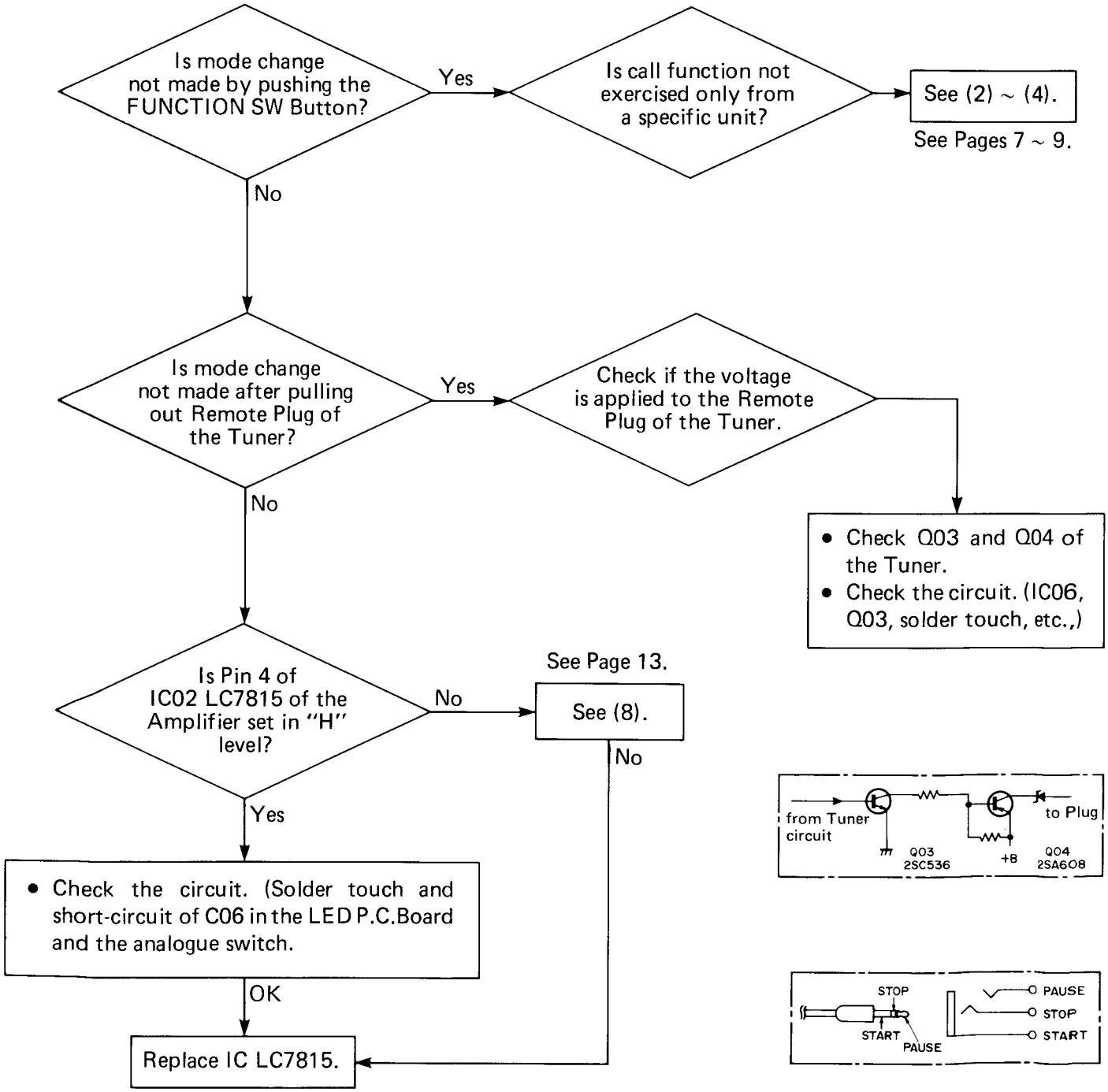
4. If abnormality has disappeared, check the unit not connected to the amplifier and repair it.
5. If abnormality does not disappear yet, the amplifier has some trouble.
   - When the power switch of the amplifier is turned on, the first mode is set to "TUNER" position.
     (Pulses are generated by C06, R01, and D06 in the switch circuit and fed into Pin 4 TUNER of IC LC7815.)
   - When the power switch is turned on, the SYNCHRO REC is also set in "ON" mode.
     (Pulses are generated by C27 and R26 in the Graphic P.C.Board and fed to Pin 6 of IC LC4013 to activate the SYNCHRO REC function.

TROUBLE SHOOTING GUIDE (Continued)

AUTO FUNCTION

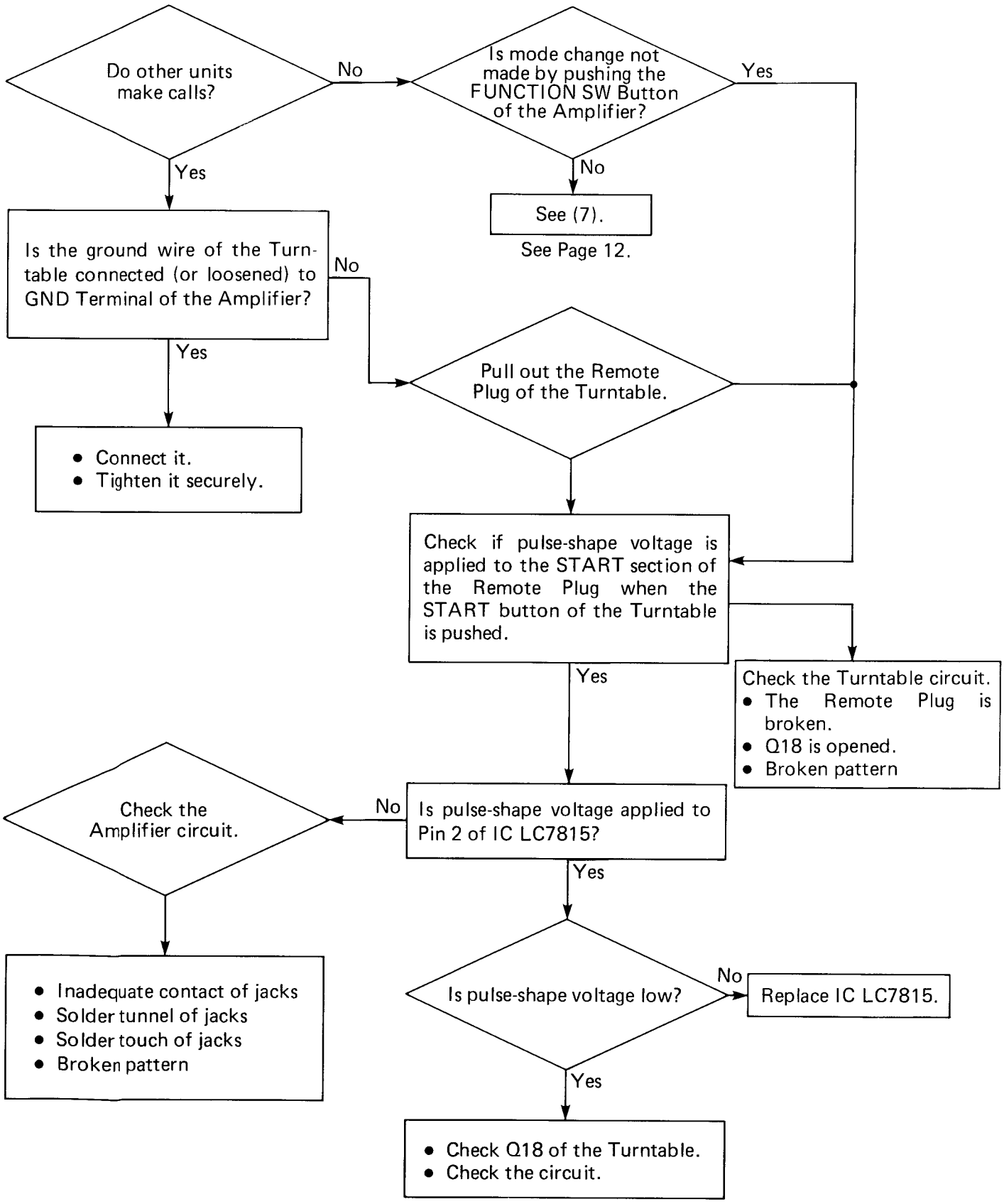
- Direct call cannot be exercised while the digital system is functioning (while the frequencies are changing sucessively.) and this is not a trouble. As "TUNER" mode is kept, check in advance that the stop mode is displayed.
- AUTO FUNCTION/SYNCHRO REC CORD is sometimes called "REMOTE PLUG" hereinafter.

1. No mode change can be made from "TUNER" position.


Is mode change not made by pushing the FUNCTION SW Button?
Yes
Is call function not exercised only from a specific unit?
See (2) ~ (4).
See Pages 7 ~ 9.
No
Is mode change not made after pulling out Remote Plug of the Tuner?
Yes
Check if the voltage is applied to the Remote Plug of the Tuner.
No
• Check Q03 and Q04 of the Tuner.
• Check the circuit. (IC06, Q03, solder touch, etc.,)
Is Pin 4 of IC02 LC7815 of the Amplifier set in "H" level?
No
See (8).
See Page 13.
No
Yes
• Check the circuit. (Solder touch and short-circuit of C06 in the LED P.C.Board and the analogue switch.
OK
Replace IC LC7815.
from Tuner circuit
Q03 2SC536
+B
Q04 2SA608
to Plug
STOP
START
PAUSE
PAUSE
STOP
START

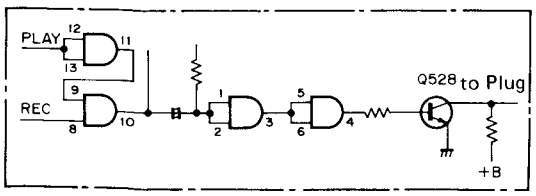
TROUBLE SHOOTING GUIDE (Continued)

2. Direct call is not made after starting the Turntable (TP M15).


Do other units make calls?
No
Is mode change not made by pushing the FUNCTION SW Button of the Amplifier?
Yes
Yes
No
See (7).
See Page 12.
Is the ground wire of the Turntable connected (or loosened) to GND Terminal of the Amplifier?
No
Yes
Pull out the Remote Plug of the Turntable.
• Connect it.
• Tighten it securely.
Check if pulse-shape voltage is applied to the START section of the Remote Plug when the START button of the Turntable is pushed.
Check the Turntable circuit.
• The Remote Plug is broken.
• Q18 is opened.
• Broken pattern
Yes
Check the Amplifier circuit.
No
Is pulse-shape voltage applied to Pin 2 of IC LC7815?
Yes
• Inadequate contact of jacks
• Solder tunnel of jacks
• Solder touch of jacks
• Broken pattern
Is pulse-shape voltage low?
No
Replace IC LC7815.
Yes
• Check Q18 of the Turntable.
• Check the circuit.

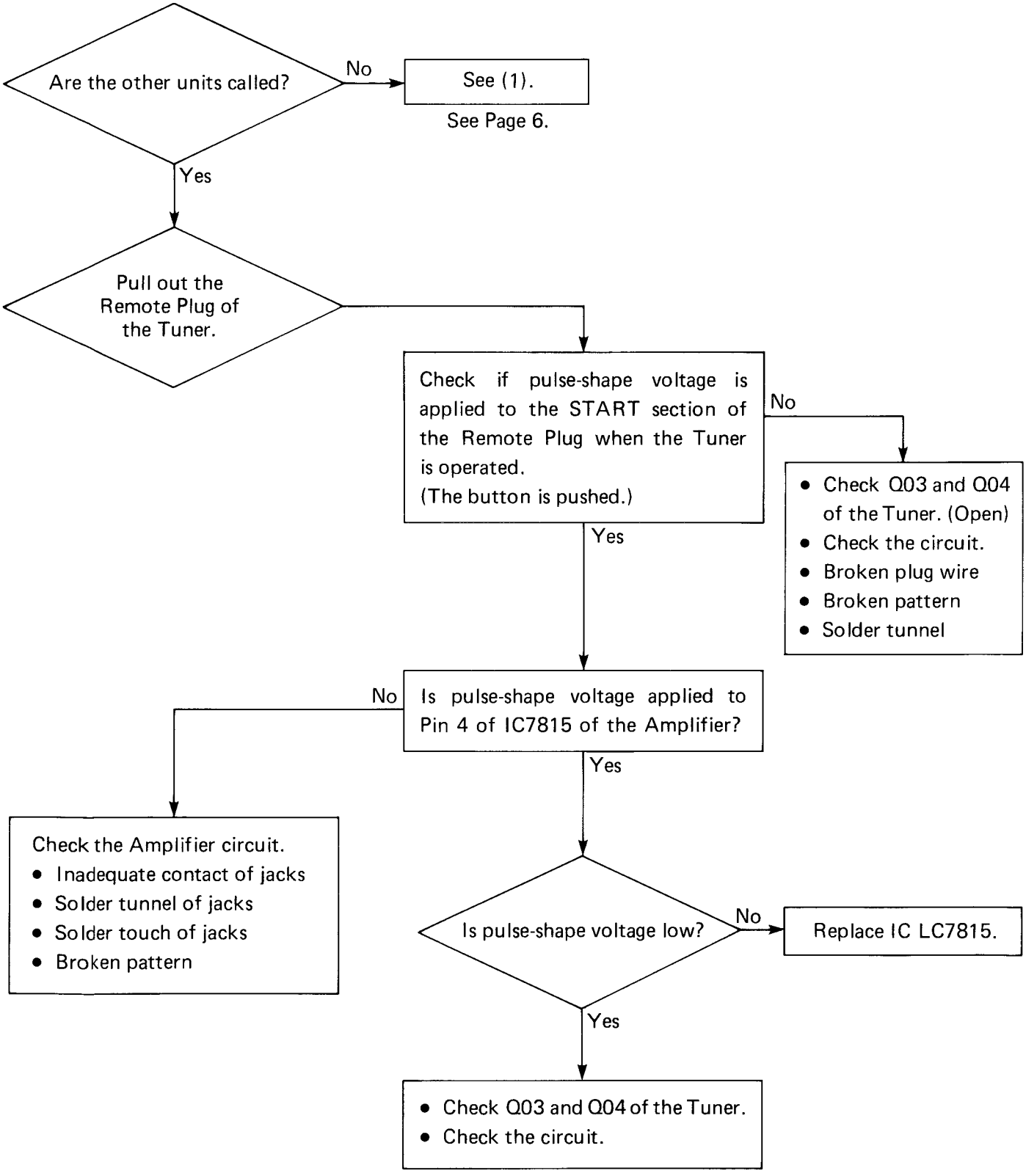
TROUBLE SHOOTING GUIDE (Continued)

3. Direct call is not made after playing the Cassette Deck (RD M15).



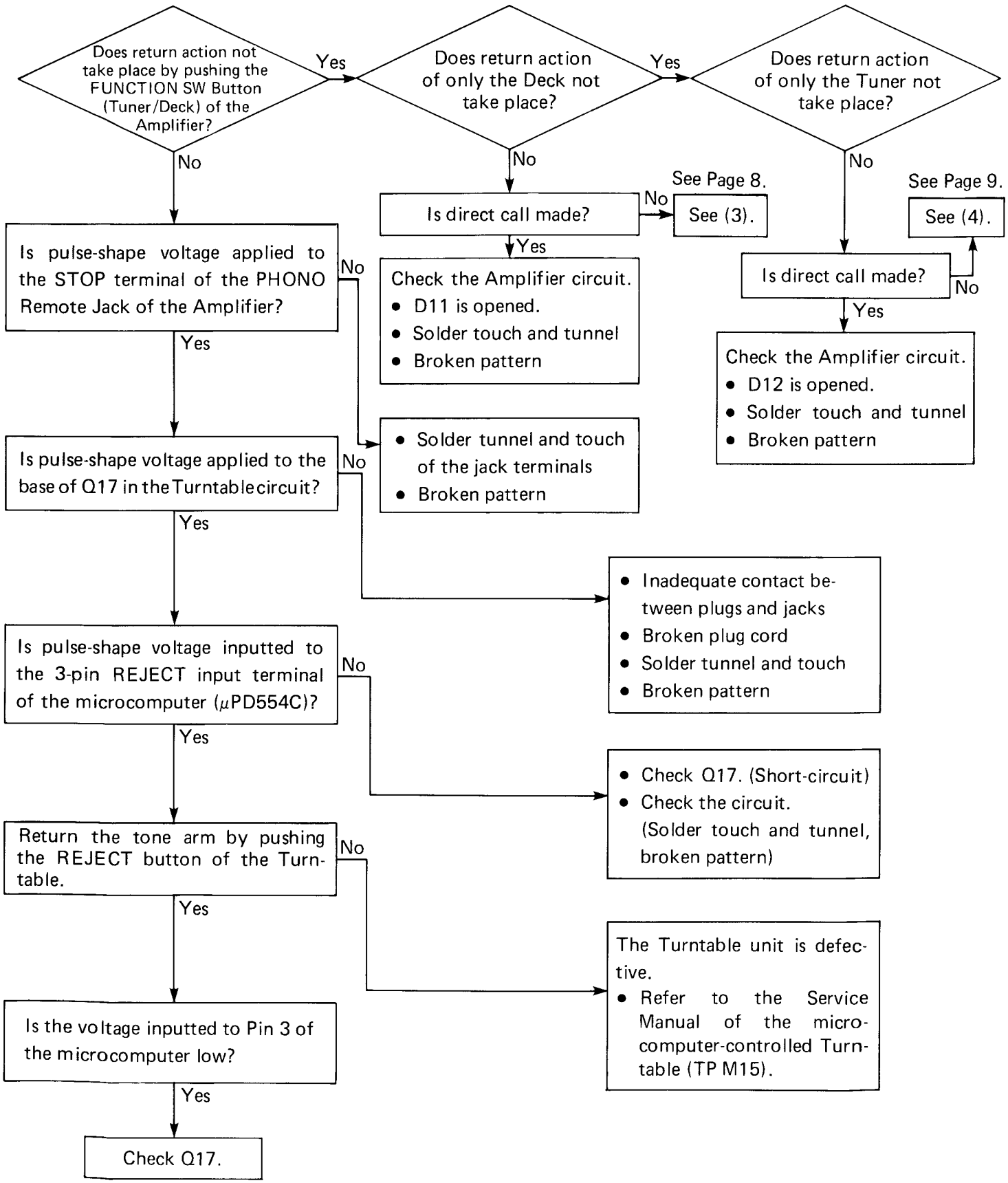
TROUBLE SHOOTING GUIDE (Continued)

4. Direct call is not made after operating the Radio Tuner (FMT M15).


Are the other units called?
No
See (1).
See Page 6.
Yes
Pull out the Remote Plug of the Tuner.
Check if pulse-shape voltage is applied to the START section of the Remote Plug when the Tuner is operated.
(The button is pushed.)
No
• Check Q03 and Q04 of the Tuner. (Open)
• Check the circuit.
• Broken plug wire
• Broken pattern
• Solder tunnel
Yes
No
Is pulse-shape voltage applied to Pin 4 of IC7815 of the Amplifier?
Yes
Check the Amplifier circuit.
• Inadequate contact of jacks
• Solder tunnel of jacks
• Solder touch of jacks
• Broken pattern
Is pulse-shape voltage low?
No
Replace IC LC7815.
Yes
• Check Q03 and Q04 of the Tuner.
• Check the circuit.

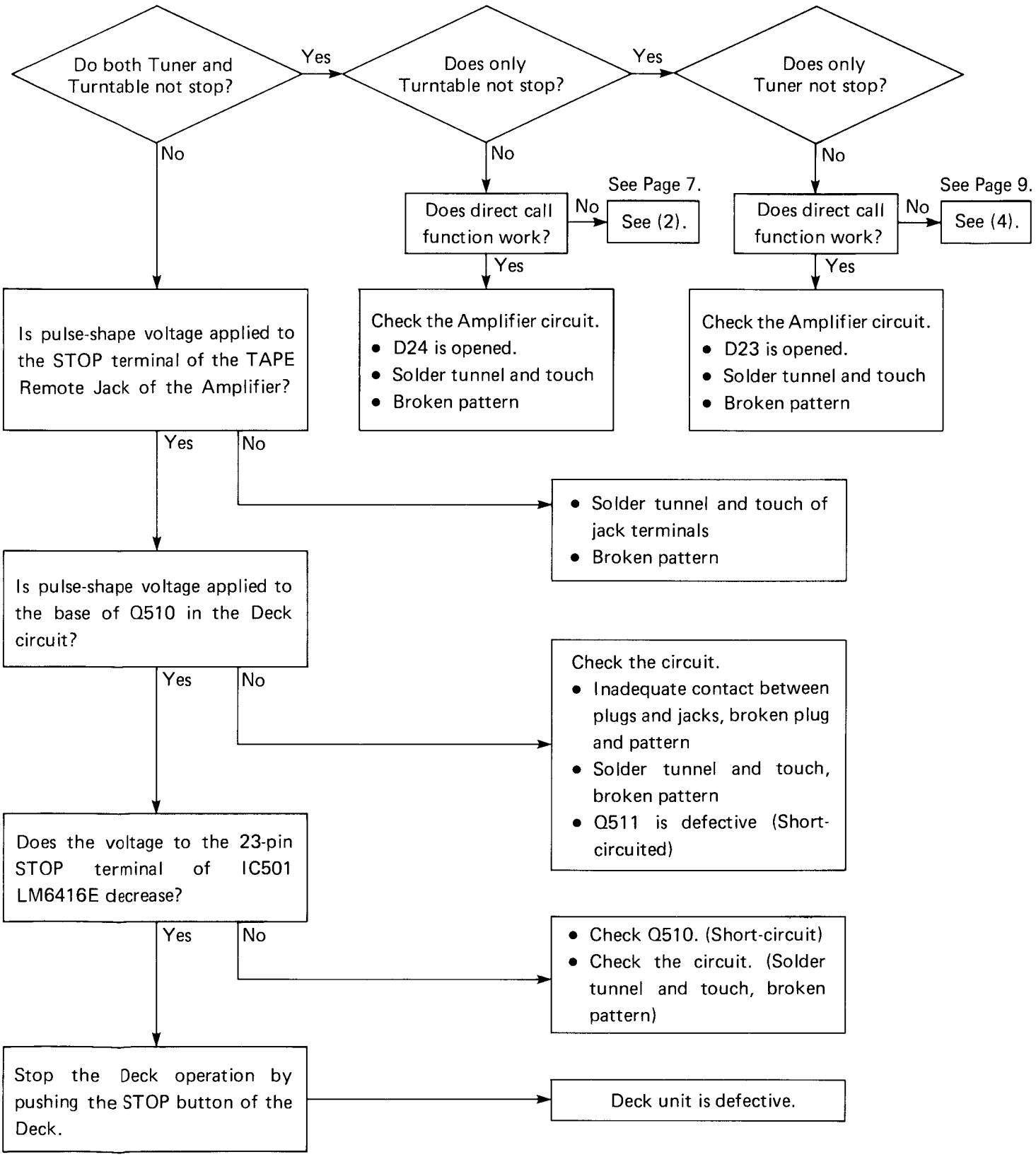
TROUBLE SHOOTING GUIDE (Continued)

5. Return action does not take place after operating the Tuner or Deck while the Turntable is operating.


Does return action not take place by pushing the FUNCTION SW Button (Tuner/Deck) of the Amplifier?
Yes
Does return action of only the Deck not take place?
Yes
Does return action of only the Tuner not take place?
No
No
No
See Page 8.
See (3).
See Page 9.
See (4).
Is direct call made?
No
Yes
Check the Amplifier circuit.
• D11 is opened.
• Solder touch and tunnel
• Broken pattern
Is direct call made?
No
Yes
Check the Amplifier circuit.
• D12 is opened.
• Solder touch and tunnel
• Broken pattern
Is pulse-shape voltage applied to the STOP terminal of the PHONO Remote Jack of the Amplifier?
No
Yes
• Solder tunnel and touch of the jack terminals
• Broken pattern
Is pulse-shape voltage applied to the base of Q17 in the Turntable circuit?
No
Yes
• Inadequate contact between plugs and jacks
• Broken plug cord
• Solder tunnel and touch
• Broken pattern
Is pulse-shape voltage inputted to the 3-pin REJECT input terminal of the microcomputer (μPD554C)?
No
Yes
• Check Q17. (Short-circuit)
• Check the circuit. (Solder touch and tunnel, broken pattern)
Return the tone arm by pushing the REJECT button of the Turntable.
No
Yes
The Turntable unit is defective.
• Refer to the Service Manual of the microcomputer-controlled Turntable (TP M15).
Is the voltage inputted to Pin 3 of the microcomputer low?
Yes
Check Q17.

TROUBLE SHOOTING GUIDE (Continued)

6. Stop action does not take place after operating the Tuner or starting the Turntable while the Deck is in "PLAY/REC" mode.

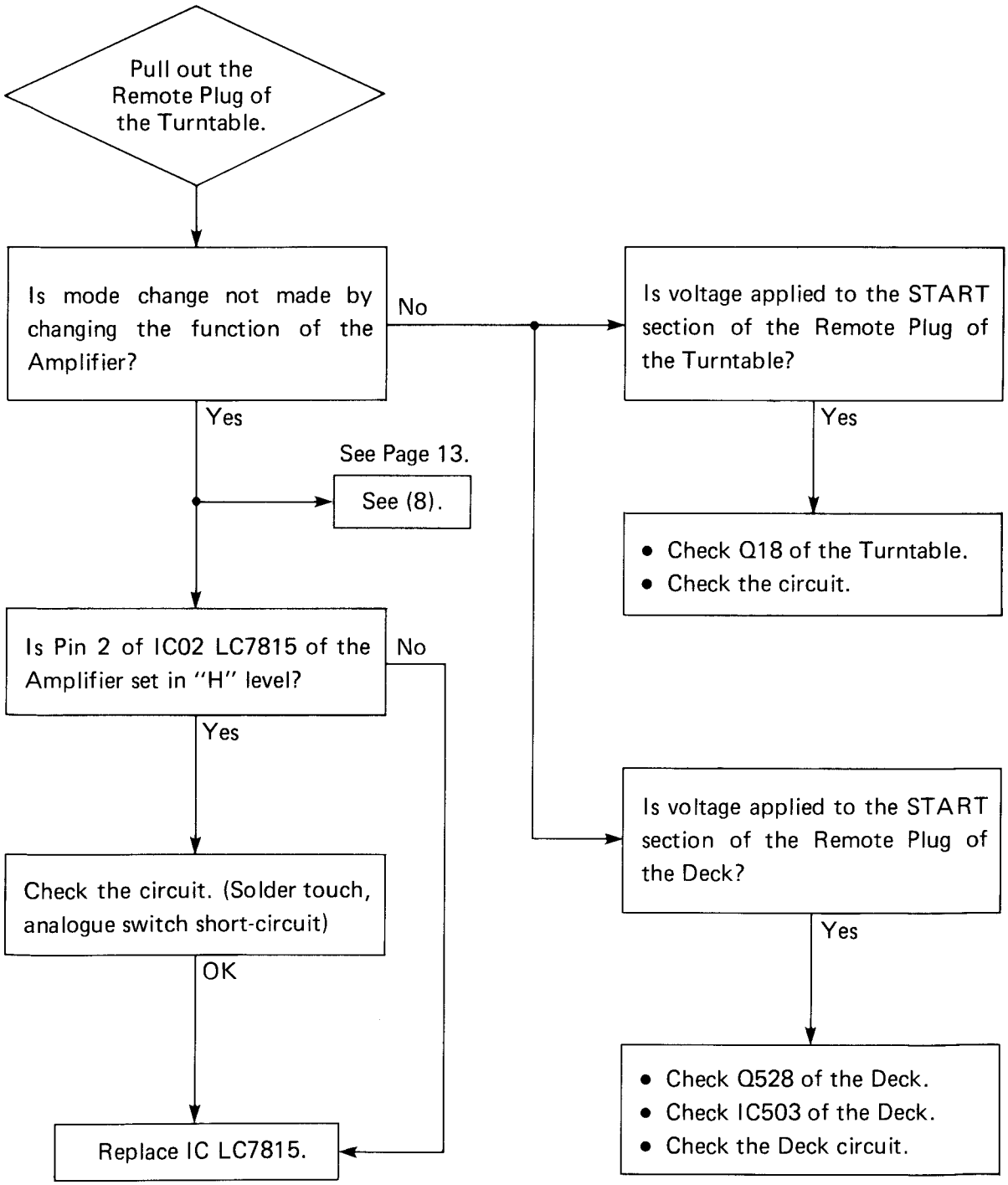

Do both Tuner and Turntable not stop?
Yes
Does only Turntable not stop?
Yes
Does only Tuner not stop?
No
No
No
See Page 7.
Does direct call function work?
No
See (2).
Yes
See Page 9.
Does direct call function work?
No
See (4).
Yes
Is pulse-shape voltage applied to the STOP terminal of the TAPE Remote Jack of the Amplifier?
Check the Amplifier circuit.
• D24 is opened.
• Solder tunnel and touch
• Broken pattern
Check the Amplifier circuit.
• D23 is opened.
• Solder tunnel and touch
• Broken pattern
Yes
No
• Solder tunnel and touch of jack terminals
• Broken pattern
Is pulse-shape voltage applied to the base of Q510 in the Deck circuit?
Yes
No
Check the circuit.
• Inadequate contact between plugs and jacks, broken plug and pattern
• Solder tunnel and touch, broken pattern
• Q511 is defective (Short-circuited)
Does the voltage to the 23-pin STOP terminal of IC501 LM6416E decrease?
Yes
No
• Check Q510. (Short-circuit)
• Check the circuit. (Solder tunnel and touch, broken pattern)
Stop the Deck operation by pushing the STOP button of the Deck.
Deck unit is defective.

TROUBLE SHOOTING GUIDE (Continued)

7. When power is applied, the unit is set in "PHONO" position and no mode change is made by changing over the function.

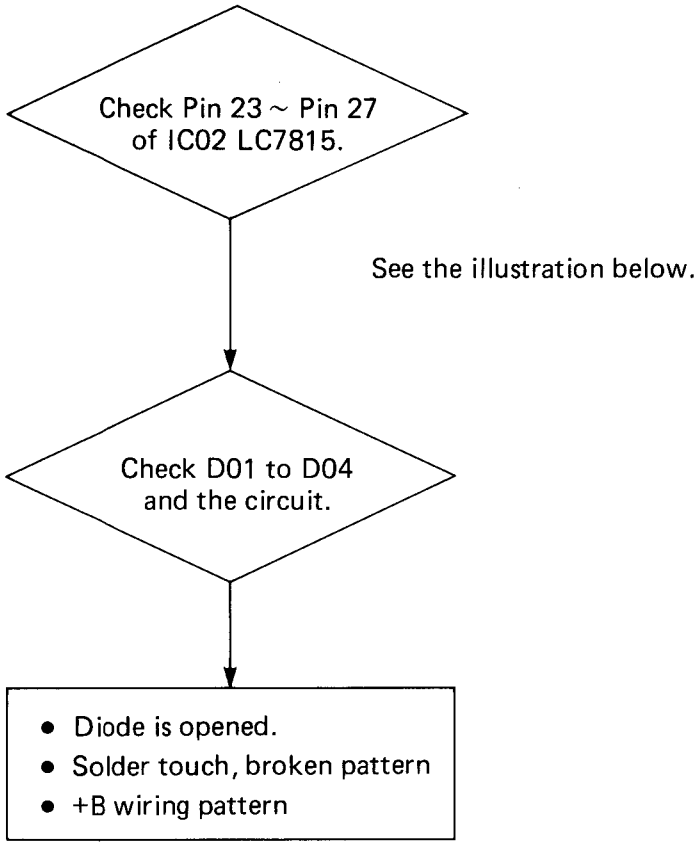
   When power is applied, the unit is set in "AUX/CD" position.

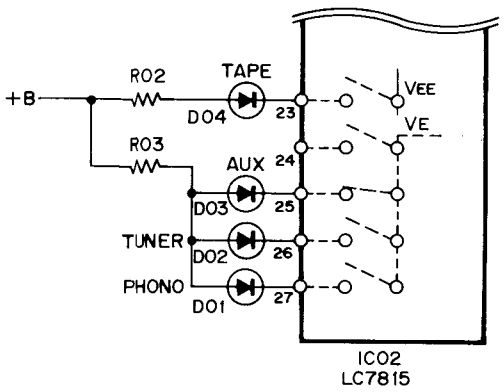
   When power is applied, the unit is set in "TAPE" position.


Pull out the Remote Plug of the Turntable.
Is mode change not made by changing the function of the Amplifier?
No
Yes
See Page 13.
See (8).
Is Pin 2 of IC02 LC7815 of the Amplifier set in "H" level?
No
Yes
Check the circuit. (Solder touch, analogue switch short-circuit)
OK
Replace IC LC7815.
Is voltage applied to the START section of the Remote Plug of the Turntable?
Yes
• Check Q18 of the Turntable.
• Check the circuit.
Is voltage applied to the START section of the Remote Plug of the Deck?
Yes
• Check Q528 of the Deck.
• Check IC503 of the Deck.
• Check the Deck circuit.

TROUBLE SHOOTING GUIDE (Continued)

8. The circuits are changed over but the display LED does not go on or out.


Check Pin 23 ~ Pin 27 of IC02 LC7815.
See the illustration below.
Check D01 to D04 and the circuit.
• Diode is opened.
• Solder touch, broken pattern
• +B wiring pattern



IC Pin Numbers	27	26	25
PHONO lamp: ON	−11.5 V	0 V	0 V
TUNER lamp: ON	0 V	−11.5 V	0 V
AUX lamp: ON	0 V	0 V	−11.5 V
TAPE lamp: ON	Pin 23	−11.5 V	
TAPE lamp: OFF		+11.5 V	

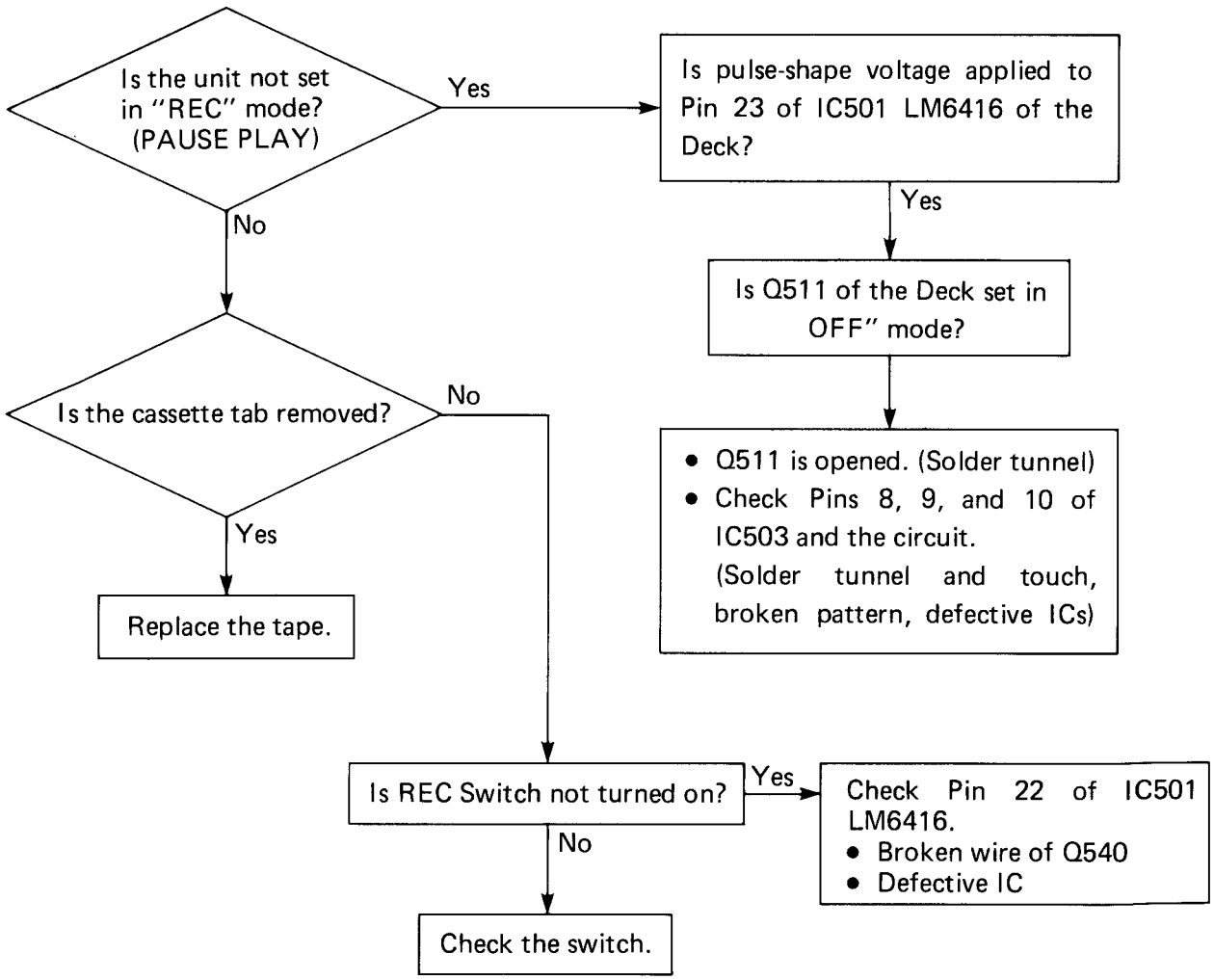
TROUBLE SHOOTING GUIDE (Continued)

SYNCHRO REC

- Awaiting mode of disk sound recording is set by pushing the SYNCHRO button "ON". The pause mode (awaiting mode) is automatically released by pushing the START button and the recording starts.
- When the CUEING/REJECT button is pushed while recording and the tone arm ascends after the record play, the time space of about 4 seconds is made and the pause action takes place. When the CUEING button is pushed again and the arm descends, the pause mode is automatically released and the recording starts again.

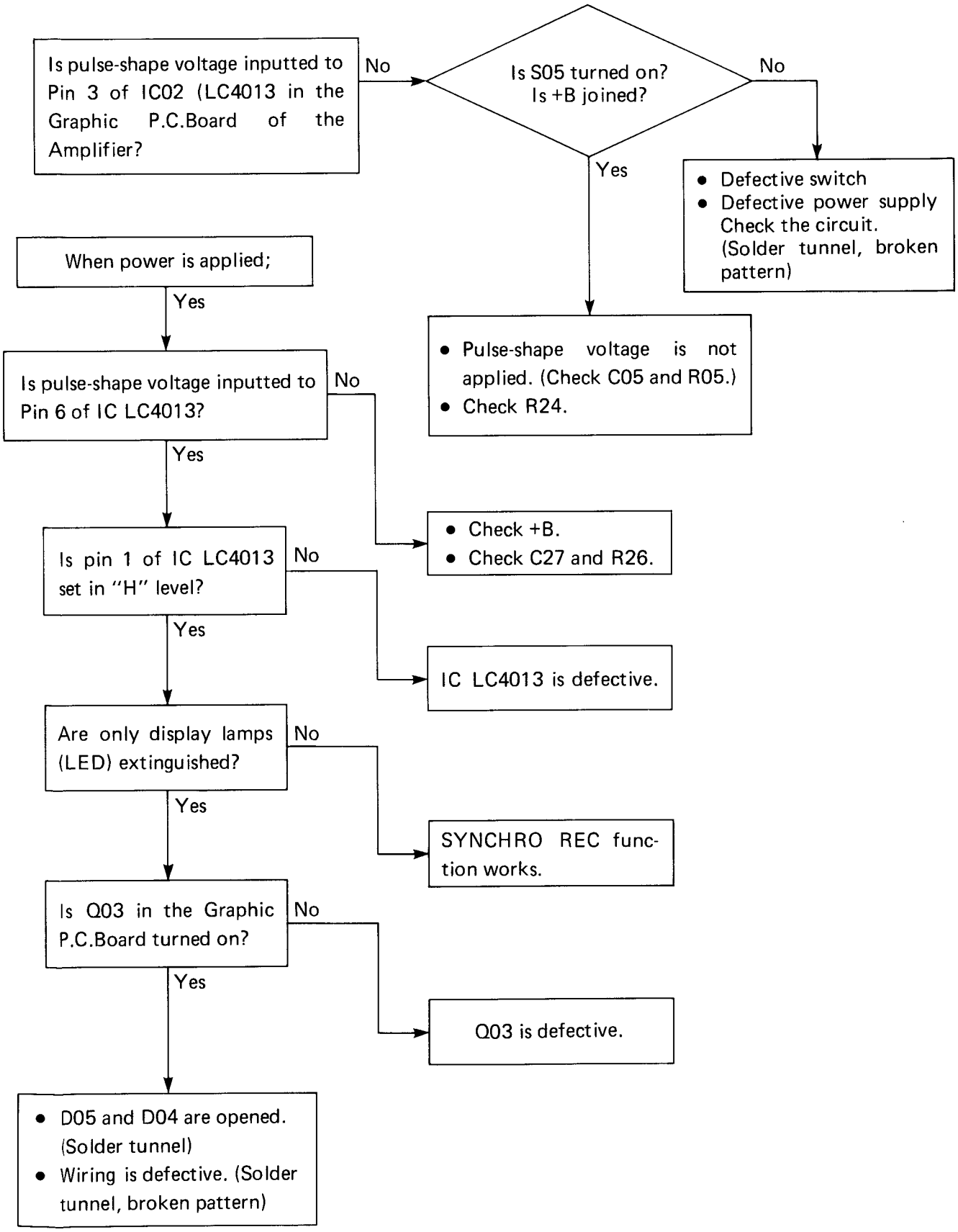
* When the PAUSE button is pushed by mistake during the recording operation and then, the CUEING/REJECT button is pushed, the tape rotation is reversed but it is not a trouble.
When the CUEING button is pushed again before the time space of about 4 seconds is made, the tape rotation is also reversed.

1. SYNCHRO REC mode is released after pushing the START button and the operation stops.


Is the unit not set in "REC" mode? (PAUSE PLAY)
Yes
Is pulse-shape voltage applied to Pin 23 of IC501 LM6416 of the Deck?
Yes
Is Q511 of the Deck set in OFF" mode?
• Q511 is opened. (Solder tunnel)
• Check Pins 8, 9, and 10 of IC503 and the circuit.
(Solder tunnel and touch, broken pattern, defective ICs)
No
Is the cassette tab removed?
No
Yes
Replace the tape.
Is REC Switch not turned on?
Yes
Check Pin 22 of IC501 LM6416.
• Broken wire of Q540
• Defective IC
No
Check the switch.

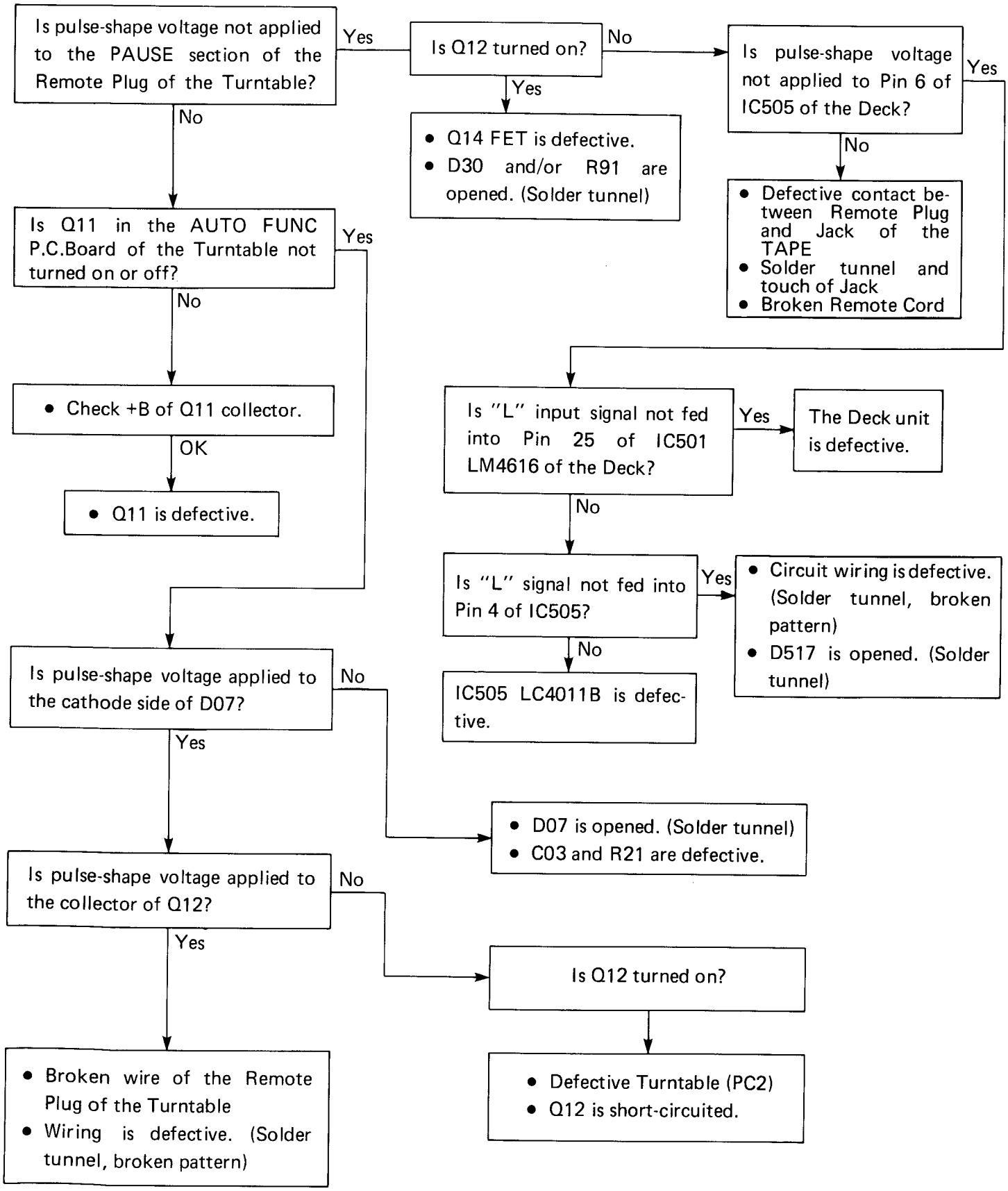
TROUBLE SHOOTING GUIDE (Continued)

2. SYNCHRO switch cannot be turned on.


Is pulse-shape voltage inputted to Pin 3 of IC02 (LC4013 in the Graphic P.C.Board of the Amplifier?
No
Is S05 turned on? Is +B joined?
No
Yes
• Defective switch
• Defective power supply Check the circuit. (Solder tunnel, broken pattern)
When power is applied;
Yes
• Pulse-shape voltage is not applied. (Check C05 and R05.)
• Check R24.
Is pulse-shape voltage inputted to Pin 6 of IC LC4013?
No
Yes
• Check +B.
• Check C27 and R26.
Is pin 1 of IC LC4013 set in "H" level?
No
Yes
IC LC4013 is defective.
Are only display lamps (LED) extinguished?
No
Yes
SYNCHRO REC function works.
Is Q03 in the Graphic P.C.Board turned on?
No
Yes
Q03 is defective.
• D05 and D04 are opened. (Solder tunnel)
• Wiring is defective. (Solder tunnel, broken pattern)

TROUBLE SHOOTING GUIDE (Continued)

3. Pause mode cannot be released after the play begins by pushing the START button.

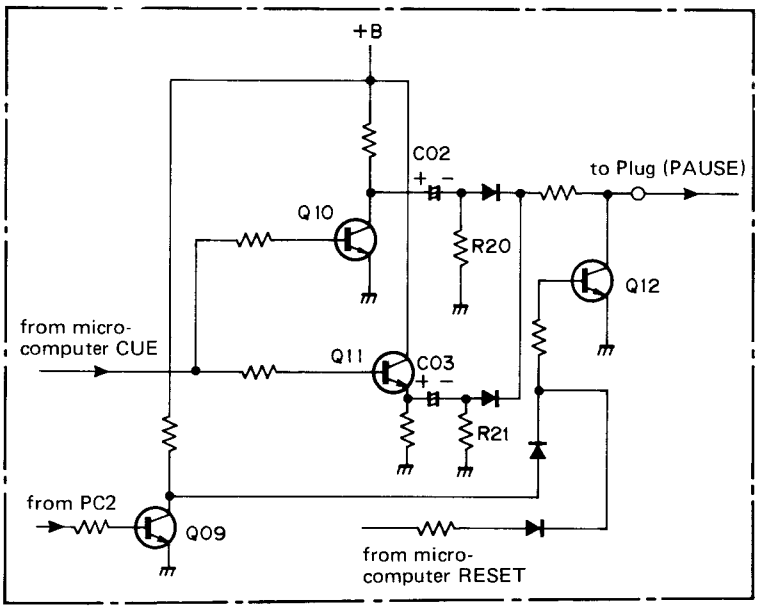

Is pulse-shape voltage not applied to the PAUSE section of the Remote Plug of the Turntable?
Yes
Is Q12 turned on?
No
Is pulse-shape voltage not applied to Pin 6 of IC505 of the Deck?
Yes
No
Yes
• Q14 FET is defective.
• D30 and/or R91 are opened. (Solder tunnel)
• Defective contact between Remote Plug and Jack of the TAPE
• Solder tunnel and touch of Jack
• Broken Remote Cord
Is Q11 in the AUTO FUNC P.C.Board of the Turntable not turned on or off?
Yes
No
• Check +B of Q11 collector.
OK
• Q11 is defective.
Is "L" input signal not fed into Pin 25 of IC501 LM4616 of the Deck?
Yes
The Deck unit is defective.
No
Is "L" signal not fed into Pin 4 of IC505?
Yes
• Circuit wiring is defective. (Solder tunnel, broken pattern)
• D517 is opened. (Solder tunnel)
No
IC505 LC4011B is defective.
Is pulse-shape voltage applied to the cathode side of D07?
No
Yes
• D07 is opened. (Solder tunnel)
• C03 and R21 are defective.
Is pulse-shape voltage applied to the collector of Q12?
No
Yes
Is Q12 turned on?
• Broken wire of the Remote Plug of the Turntable
• Wiring is defective. (Solder tunnel, broken pattern)
• Defective Turntable (PC2)
• Q12 is short-circuited.

TROUBLE SHOOTING GUIDE (Continued)

4. Pause function does not work after pushing the CUE/REJECT button (end of play) ... after about 4 seconds

Same as (3)

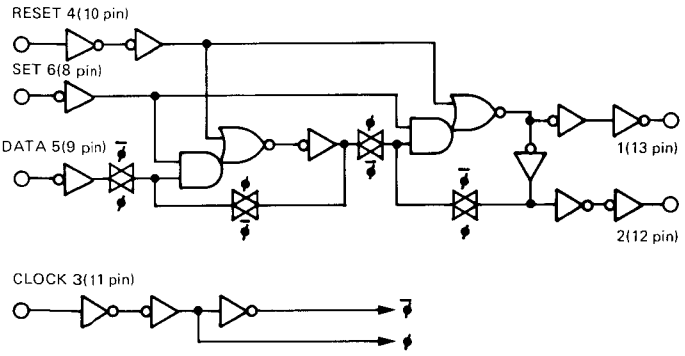
Note: Q11 in the dotted box above must be changed to Q10 when the CUEING is set in "UP" mode.



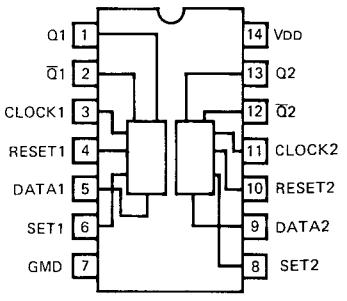
- When the tone arm is resting on the arm-rest, PC2 is set in "L" level. Therefore, no signal comes out when the CUEING is set in "UP" or "DOWN" position because Q09 is set in "OFF" mode and Q12 in "ON" mode.
- As CUE is set in "H" level with the CUEING in "UP" position, Q10 becomes "ON" mode and pulses are generated by C02 and R20. As CUE is set in "L" level with the CUEING in "DOWN" position, Q11 becomes "OFF" mode and pulses are generated by C03 and R21.

IC EQUIVALENT CIRCUIT & BLOCK DIAGRAM

DUAL A-TYPE FLIP-FLOP IC LC4013B

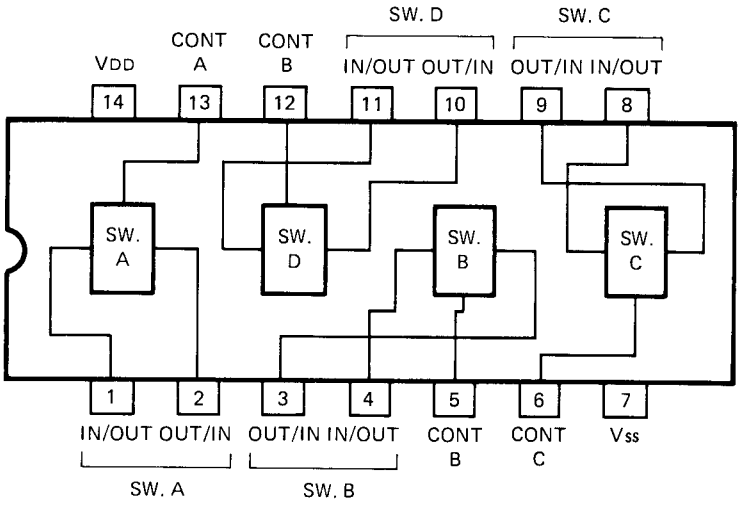


LC4013B

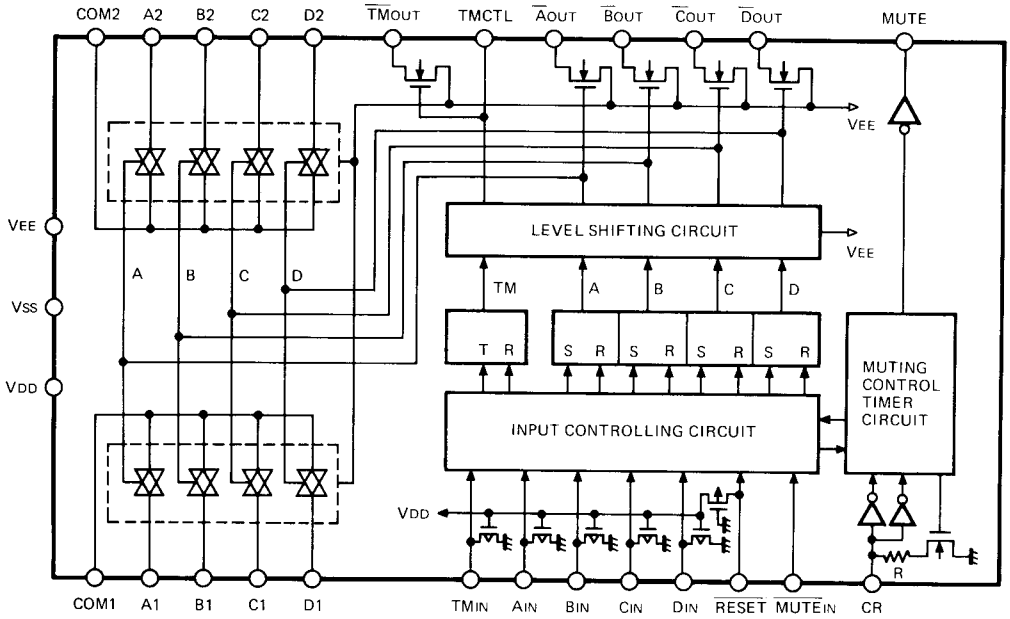


IC EQUIVALENT CIRCUIT & BLOCK DIAGRAM (Continued)

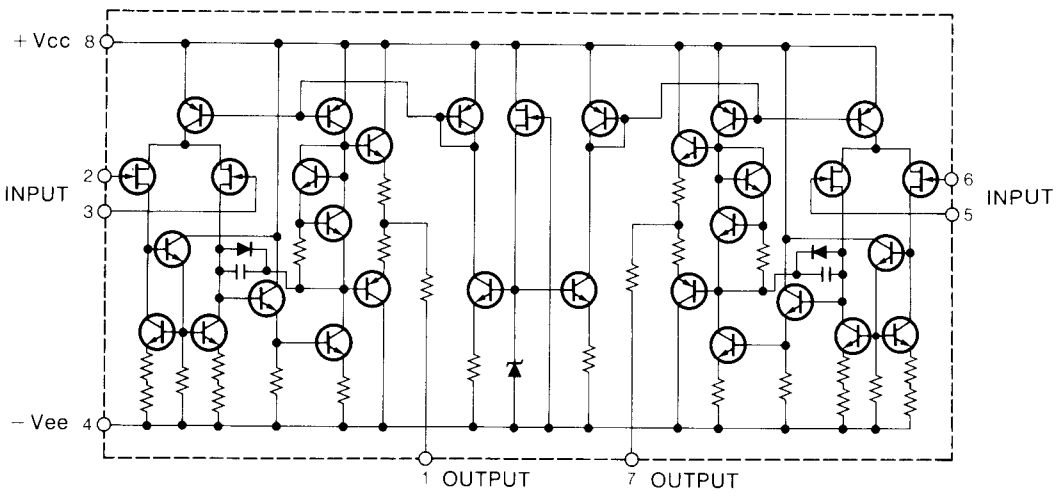
QUAD BILATERAL SWITCH IC LC4066BH



ANALOGUE FUNCTION SWITCH IC LC7815H

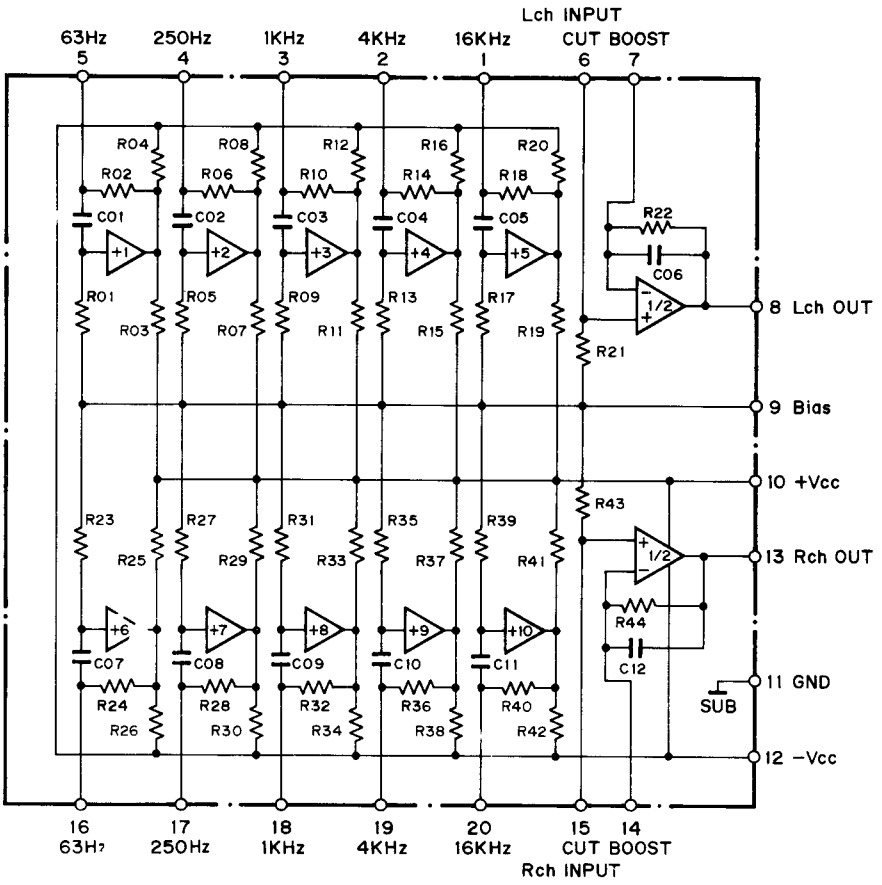


PHONO EQ/PREAMP MIC AMP IC NJM072D

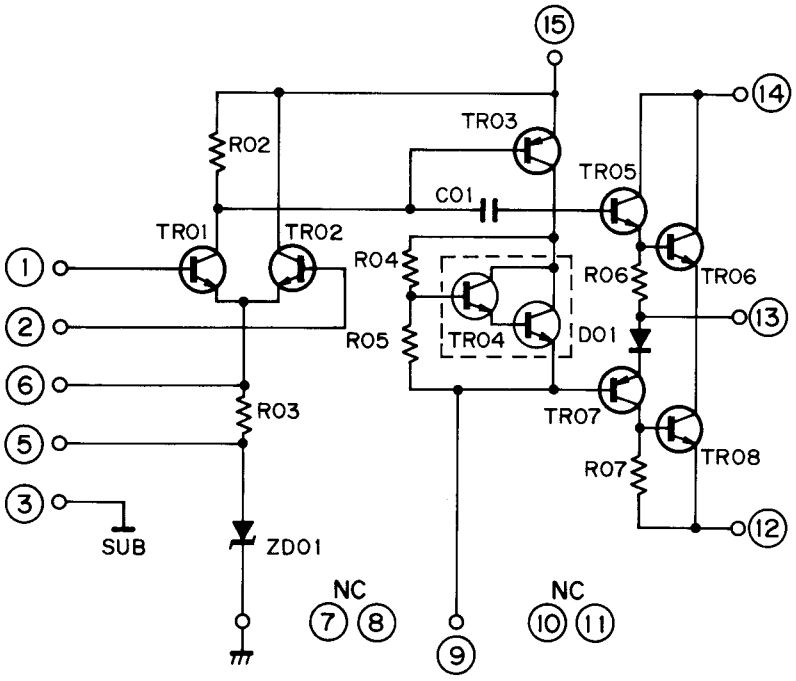


IC EQUIVALENT CIRCUIT & BLOCK DIAGRAM (Continued)

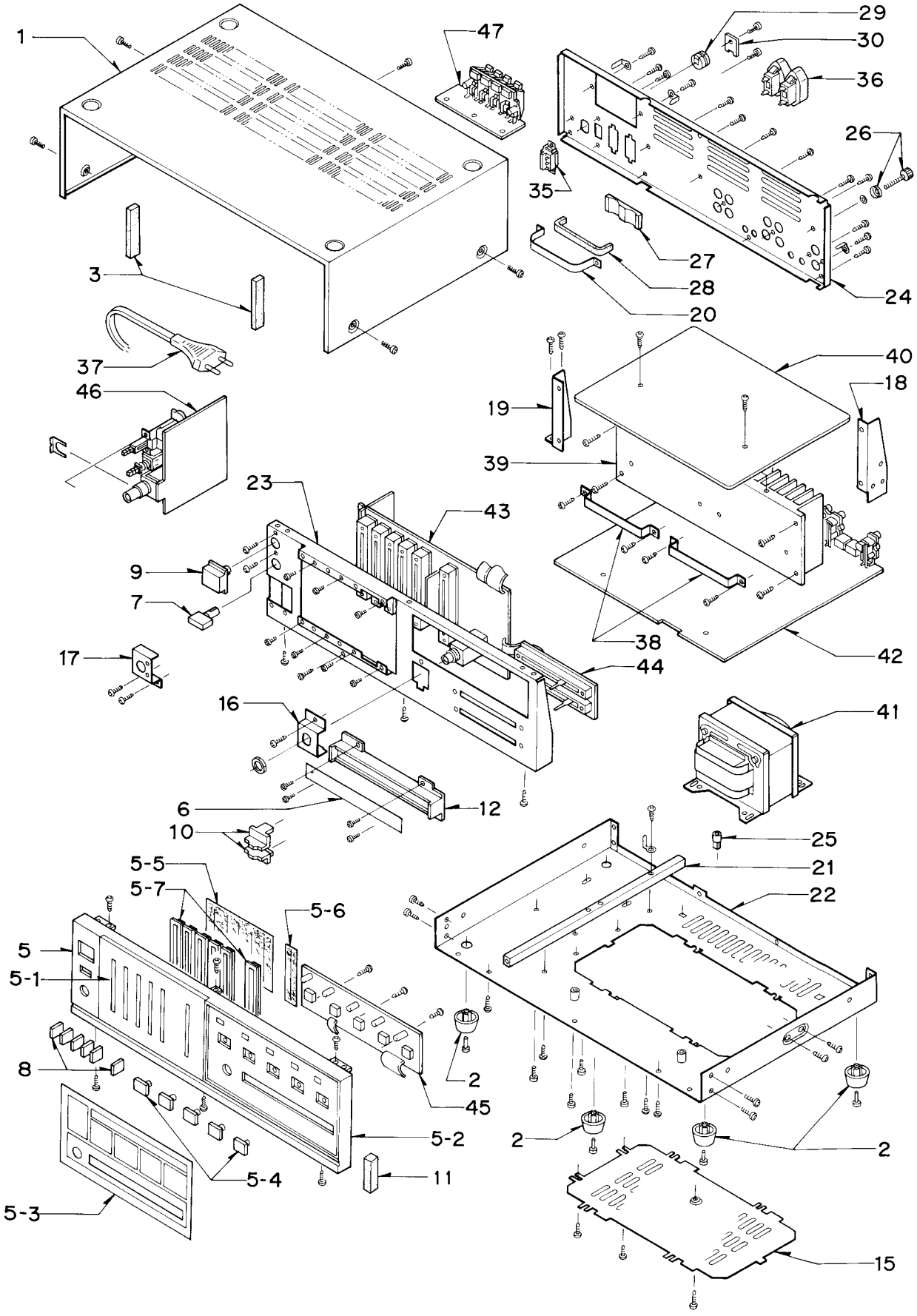
GRAPHIC EQUALIZER IC STK6328A



POWER AMPLIFIER IC STK4036



CABINET & CHASSIS EXPLODED VIEW



PARTS LIST

PACKING PARTS LIST

Ref. No.	Parts Number	Description
	131 6 1169 08605	Box Corrugate-EXP (Silver)
	131 6 1169 08611	Box Corrugate-EXP (Blue)
	131 6 2119 02131	Bag Polyethylene-EXP
	131 6 3009 33930	Pad (Left)
	131 6 3009 33940	Pad (Right)
	131 6 3069 16350	Patching Sheet

ACCESSORIES PARTS LIST

Ref. No.	Parts Number	Description
	131 6 2719 10600	Bag Fan
	131 6 4169 06900	Explanatory Booklet (Silver)
	131 6 4169 08900	Explanatory Booklet (Blue)

CABINET PARTS LIST

Ref. No.	Parts Number	Description
1	131 2 1410 29200	Cover
2	131 2 1801 14600	Leg
3	131 2 5205 29000	Cushion

APPEARANCE PARTS LIST

Ref. No.	Parts Number	Description
5	131 0 1016 42501	Panel Decorative Assy (Silver)
5-1	131 2 1110 33601	Plate Decorative
5-2	131 2 1202 21201	Escutcheon
5-3	131 2 1203 58000	Panel Control
5-4	131 2 4208 42000	Spacer
5-5	131 2 6110 31700	Shelter Light
5-6	131 2 6110 31800	Shelter Light
5-7	131 2 6113 48400	Shelter
5	131 0 1016 42503	Panel Decorative Assy (Blue)
5-1	131 2 1110 33603	Plate Decorative
5-2	131 2 1202 21203	Escutcheon
5-3	131 2 1203 58002	Panel Control
5-4	131 2 4208 42000	Spacer
5-5	131 2 6110 31700	Shelter Light
5-6	131 2 6110 31800	Shelter Light
5-7	131 2 6113 48400	Shelter
6	131 2 1110 33500	Plate Decorative
7	131 2 1601 70101	Knob (Speaker)
8	131 2 1601 71000	Knob (Graphic EQ)
9	131 2 1601 86200	Knob (Power)
10	131 2 1601 86400	Knob (Volume)
11	131 2 5206 13900	Mold Plane
12	131 2 6113 48300	Shelter

CHASSIS PARTS LIST

Ref. No.		Parts Number	Description
15	*	131 2 1410 29300	Cover
16	*	131 2 3101 89100	Metal Mount
17	*	131 2 3101 89200	Metal Mount
18	*	131 2 3101 89300	Metal Mount
19	*	131 2 3101 89400	Metal Mount
20	*	131 2 3101 89500	Metal Mount
21	*	131 2 3202 14400	Metal Reinforce
22	*	131 2 3301 30200	Chassis
23	*	131 2 3305 34400	Panel Front
24	*	131 2 3306 37900	Panel Rear
25		131 2 3614 20300	Mount P.C.B.
26		131 2 4201 17800	Screw (GND)
27		131 2 5205 22501	Cushion
28		131 2 5205 29200	Cushion
29		131 2 6111 14200	Bushing
30		131 2 7104 00500	Plate Pad Switch

ELECTRICAL PARTS LIST

Ref. No.		Parts Number	Description
35	⚠	4 2312 01020	Switch Slide (Volt Select)
36	⚠	4 2352 00450	AC Socket
37	⚠	4 2432 00071	Line Cord
38		131 2 3101 88900	Metal Mount
39		131 2 6201 33100	Plate Heat Sink
40		131 2 6201 33200	Plate Heat Sink
41	⚠	4 2512 20320	Power Transformer
42		131 0 4001 11872	Main, EQ P.C.B. Assy
43		131 0 4001 11882	Graphic P.C.B. Assy
44		131 0 4001 11890	Volume P.C.B. Assy
45		131 0 4001 11900	L.E.D. P.C.B. Assy
46		131 0 4001 13140	AC Switch P.C.B. Assy
47		131 0 4001 13150	Speaker Terminal P.C.B. Assy

*—Not a service part.

PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing. Components identified with the IEC symbol ⚠ in the parts list and the schematic diagram designate components in which safety can be of special significance. When replacing a component identified with ⚠, use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual.
Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

MAIN, EQ P.C.B. Assy
131 0 4001 11872

Ref. No.		Parts Number	Description
		4 2352 00200	Fuse Clip
		4 2352 01701	Pin Jack 4P
		4 2352 01751	Pin Jack 2P
		131 0 4006 33702	Cord Assy
		131 2 6108 11201	Cover Sever
		131 2 6201 32800	Plate Heat Sink
F04,05	⚠	4 2349 20590	Fuse T 4.0 A
JK01,02 03,04		4 2352 01730	Jack 3P
P01		4 2362 00470	Plug 10P
RY01	⚠	4 2322 00170	Relay

CAPACITORS

C01,02	C1HRY-475APA	Electrolytic	4.7 μF	50V	
C03,04	C1HCYK101APA	Ceramic	100 pF	50V	±10%
C05,06	C1ARY-476APA	Electrolytic	47 μF	10V	
C07,08	C1HFYK472APA	Mylar	0.0047 μF	50V	±10%
C09,10	C1HFYK183APA	Mylar	0.018 μF	50V	±10%
C11,12	C1HRY-105APA	Electrolytic	1 μF	50V	
C13,14	C1ERY-107APA	Electrolytic	100 μF	25V	
C15,16 17,18 19,20	C1ERY-106APA	Electrolytic	10 μF	25V	
C21,22	C1HRY-105APA	Electrolytic	1 μF	50V	
C23,24	C0JRY-107APA	Electrolytic	100 μF	6.3V	
C25,26	C1HCZK221BPA	Ceramic	220 pF	50V	±10%
C27,28	C1HRY-225APA	Electrolytic	2.2 μF	50V	
C29,30	C1ERY-107APA	Electrolytic	100 μF	25V	
C31,32	C1HCZK821BPA	Ceramic	820 pF	50V	±10%
C33,34	C1HRY-475APA	Electrolytic	4.7 μF	50V	
C35,36	C0JRY-107APA	Electrolytic	100 μF	6.3V	
C37,38	C1HRY-476APA	Electrolytic	47 μF	50V	
C39,40 41,42	C1HRE-107A	Electrolytic	100 μF	50V	
C43,44 45,46	C1HRY-106APA	Electrolytic	10 μF	50V	
C47,48	C1HFRM104A	Mylar	0.1 μF	50V	±20%
C49,50	C1ERY-106APA	Electrolytic	10 μF	25V	
C53,54	C1ERY-107APA	Electrolytic	100 μF	25V	
C55,56	C1VRY-476APA	Electrolytic	47 μF	35V	
C57,58	4 2232 00730	Electrolytic	7000 μF	50V	
C59,60	4 2232 00430	Ceramic	0.01 μFx2	250V	
C61	C1HRY-225APA	Electrolytic	2.2 μF	50V	
C62	C1HRE-107A	Electrolytic	100 μF	50V	
C63,64	C1HRY-105APA	Electrolytic	1 μF	50V	
C65	C1EBYK473XPA	Semiconductor	0.047 μF	25V	±10%
C66,67	C2HYDP103A	Ceramic	0.01 μF	500V	+100,—0%
C68	C1ECZN103XPA	Ceramic	10000 pF	25V	±30%
C71	C1CRY-107APA	Electrolytic	100 μF	16V	
C73,74	C1HCYK820APA	Ceramic	82 pF	50V	±10%
C75,76 77,78	C1HCDK221SL	Ceramic	220 pF	50V	±10%
C79,80 81,82	C1HYDK221R	Ceramic	220 pF	50V	±10%
C83,84	C1HCDK331SL	Ceramic	330 pF	50V	±10%
C85,86 87,88 89,90	C1HCDK221SL	Ceramic	220 pF	50V	±10%
C91,92	C1HCDK470SL	Ceramic	47 pF	50V	±10%
C93,94 95,96 97,98 99,100 101,102	C1HYDK221R	Ceramic	220 pF	50V	±10%
C103,104	C1HCDK270SL	Ceramic	27 pF	50V	±10%
C105,106	C1HBDM473W	Semiconductor	0.047 μF	50V	±20%
C107,108	C1HBDM103V	Semiconductor	0.01 μF	50V	±20%
C109	C2BFRM473B-U	Mylar	0.047 μF	125V	±20%
C110,111	C1HRE-105A	Electrolytic	1.0 μF	50V	

SEMICONDUCTORS

D01	⚠ 202 5 2720 04015	Diode, DBA40C	
D02,03	202 5 2470 13540	Diode, DS135D	
D04	202 5 1400 00120	Diode, GMA-01-4-BT	
D05	202 5 3210 05611	Zener Diode, GZA5.6X	
D06,07	202 5 3210 20013	Zener Diode, GZA20Z	
D08,09	202 5 3210 11013	Zener Diode, GZA11Z	
D10,11 12,13 14,15 16,17 18,19 20,21 22,23 24,25 26,27	202 5 1400 00120	Diode, GMA-01-4-BT	
D28	202 5 2470 13540	Diode, DS135D	
D30	202 5 1400 00120	Diode, GMA-01-4-BT	
IC01	IJJ-NJM072D-E	IC, NJM072D-E	
IC02	206 5 8897 81520	IC, LC7815 H (Function)	
IC03,04	206 5 8144 06610	IC, LC4066BH (Tape Switch)	
IC05	IJJ-NJM072D-E	IC, NJM072D-E	
IC06,07	206 5 5944 03610	IC, STK4036	
Q01	203 5 8570 33060	TR 2SD330 F	
Q02	203 5 8530 51460	TR 2SB514 F	
Q03,04 05,06	203 5 5000 53660	TR 2SC536 E, F	
Q07	203 5 7230 60860	TR 2SA608 E, F	
Q08	203 5 5000 53660	TR 2SC536 E, F	
Q09	203 5 7230 60860	TR 2SA608 E, F	
Q10	203 5 6840 56060	TR 2SB560 F	
Q11,12	203 5 4921 01270	TR 2SD1012 G	
Q14	TTT-2SK330--GR	FET 2SK330 GR	

RESISTORS

R01,02	R2CDZJ152APB	Carbon	1.5k	1/6W	±5%
R03,04	R2CDZJ334APB	Carbon	330k	1/6W	±5%
R05,06	R2CDZJ563APB	Carbon	56k	1/6W	±5%
R07,08	R2CDZJ331APB	Carbon	330	1/6W	±5%
R09,10	R2CDZJ153APB	Carbon	15k	1/6W	±5%
R11,12	R2CDZJ224APB	Carbon	220k	1/6W	±5%
R13,14	R2CDZJ104APB	Carbon	100k	1/6W	±5%
R15,16	R2EDBJ182A	Carbon	1.8k	1/4W	±5%

PARTS LIST (Continued)

Ref. No.	Parts Number	Description			
	RESISTORS				
R17,18 19,20	R2CDZJ102APB	Carbon	1k	1/6W	±5%
R21,22	R2CDZJ474APB	Carbon	470k	1/6W	±5%
R23,24 25,26	R2CDZJ102APB	Carbon	1k	1/6W	±5%
R27,28 29,30	R2CDZJ474APB	Carbon	470k	1/6W	±5%
R31,32	R2CDZJ103APB	Carbon	10k	1/6W	±5%
R33,34	R2CDZJ104APB	Carbon	100k	1/6W	±5%
R35	R2CDZJ102APB	Carbon	1k	1/6W	±5%
R36	R2CDZJ224APB	Carbon	220k	1/6W	±5%
R37	R2CDZJ104APB	Carbon	100k	1/6W	±5%
R38	R2CDZJ103APB	Carbon	10k	1/6W	±5%
R39,40	R2CDZJ474APB	Carbon	470k	1/6W	±5%
R41,42	R2CDZJ154APB	Carbon	150k	1/6W	±5%
R43,44	R2CDZJ102APB	Carbon	1k	1/6W	±5%
R45,46	R2CDZJ562APB	Carbon	5.6k	1/6W	±5%
R47,48	R2CDZJ104APB	Carbon	100k	1/6W	±5%
R49,50	R2EDBJ182A	Carbon	1.8k	1/4W	±5%
R51,52	R2CDZJ102APB	Carbon	1k	1/6W	±5%
R53,54	R2CDZJ224APB	Carbon	220k	1/6W	±5%
R55,56	R2CDZJ333APB	Carbon	33k	1/6W	±5%
R57,58	R2CDZJ152APB	Carbon	1.5k	1/6W	±5%
R59,60	R2CDZJ333APB	Carbon	33k	1/6W	±5%
R61,62 63,64	R2EDBJ222A	Carbon	2.2k	1/4W	±5%
R65,66 67,68	R2HZBJ101A	Fuse	100	1/2W	±5%
R69,70	R3DXBJ100A	Oxide Metal Film	10	2W	±5%
R71,72	R3AXBJ221A	Oxide Metal Film	220	1W	±5%
R73,74	R2EDZJ221APA	Carbon	220	1/4W	±5%
R75,76	R2HXBJ331A	Oxide Metal Film	330	1/2W	±5%
R77,78	R3WXBJ151B	Oxide Metal Film	150	3W	±5%
R79	R2HXBJ821A	Oxide Metal Film	820	1/2W	±5%
R80	R2CDZJ823APB	Carbon	82k	1/6W	±5%
R81	R2HXBJ332A	Oxide Metal Film	3.3k	1/2W	±5%
R83,84	R2CDZJ102APB	Carbon	1k	1/6W	±5%
R85,86	R2HXBJ332A	Oxide Metal Film	3.3k	1/2W	±5%
R89,90	R2CDZJ223APB	Carbon	22k	1/6W	±5%
R91	R2CDZJ103APB	Carbon	10k	1/6W	±5%

GRAPHIC P.C.B. Assy
131 0 4001 11882

Ref. No.	Parts Number	Description
	4 2362 00510	Plug 3P
JK05	4 2359 74010	Jack 1P (Microphone)
VR01	4 2222 03040	VR Slide 50k-Wx2
VR02	4 2222 03040	VR Slide 50k-Wx2
VR03	4 2222 03040	VR Slide 50k-Wx2
VR04	4 2222 03040	VR Slide 50k-Wx2
VR05	4 2222 03040	VR Slide 50k-Wx2
VR06	4 2222 03030	VR Slide 10k-Bx2
	CAPACITORS	
C01,02	CD1055000002V	Electrolytic 1 μF 50V
C03,04	CD4755000002V	Electrolytic 4.7 μF 50V
C05,06	4 2232 00720	Electrolytic 100 μF 25V
C07,08	C1HRY-475APA	Electrolytic 4.7 μF 50V
C09,10	C1HFYK682APA	Mylar 0.0068 μF 50V ±10%
C11,12	C1HFYK223APA	Mylar 0.022 μF 50V ±10%
C13,14	C1HRY-104APA	Electrolytic 0.1 μF 50V
C15,16	C1HRY-474APA	Electrolytic 0.47 μF 50V
C17,18	C1HRY-225APA	Electrolytic 2.2 μF 50V
C19,20	C1HRY-475APA	Electrolytic 4.7 μF 50V
C21,22	CD4761600002V	Electrolytic 47 μF 16V
C23	CD1055000002V	Electrolytic 1 μF 50V
C24	CD2255000002V	Electrolytic 2.2 μF 50V
C25	C1HCZK331BPA	Ceramic 330 pF 50V ±10%
C26	CD2262500002V	Electrolytic 22 μF 25V
C27	CD1055000002V	Electrolytic 1 μF 50V
C28,30	C1HYDK221R	Ceramic 220 pF 50V ±10%
C31,32 33	C1HYDK471R	Ceramic 470 pF 50V ±10%
C34,35 36	C1HYDK221R	Ceramic 220 pF 50V ±10%
C37	C1HCDK221SL	Ceramic 220 pF 50V ±10%
	SEMICONDUCTORS	
IC01	206 5 6126 32810	IC, STK6328A
IC02	206 5 9464 01310	IC, LC4013B
IC04	IJJ-NJM072D-E	IC, NJM072D-E
Q01,02	203 5 5251 57060	TR 2SC1570 F, G
Q03	203 5 5210 53660	TR 2SC536 F
	RESISTORS	
R01,02	R2CDZJ154APB	Carbon 150k 1/6W ±5%
R03,04	R2CDZJ222APB	Carbon 2.2k 1/6W ±5%
R05,06	R2CDZJ104APB	Carbon 100k 1/6W ±5%
R07,08	R2CDZJ472APB	Carbon 4.7k 1/6W ±5%
R09,10	R2CDZJ104APB	Carbon 100k 1/6W ±5%
R11,12	R2CDZJ333APB	Carbon 33k 1/6W ±5%
R13,14	R2CDZJ104APB	Carbon 100k 1/6W ±5%
R15,16	R2EDBJ121A	Carbon 120 1/4W ±5%
R17,18	R2EDBJ221A	Carbon 220 1/4W ±5%
R19	R2CDZJ562APB	Carbon 5.6k 1/6W ±5%
R20	R2CDZJ104APB	Carbon 100k 1/6W ±5%
R21	R2CDZJ102APB	Carbon 1k 1/6W ±5%
R22,23	R2CDZJ104APB	Carbon 100k 1/6W ±5%
R24	R2CDZJ103APB	Carbon 10k 1/6W ±5%
R25	R2CDZJ104APB	Carbon 100k 1/6W ±5%
R26	R2CDZJ563APB	Carbon 56k 1/6W ±5%
R27	R2CDZJ222APB	Carbon 2.2k 1/6W ±5%

PARTS LIST (Continued)

VOLUME P.C.B. Assy
131 0 4001 11890

Ref. No.	Parts Number	Description
VR01	4 2222 03020	VR Slide 50k-Ax1 (Left)
VR02	4 2222 03020	VR Slide 50k-Ax1 (Right)
	CAPACITORS	
C01,02	C1HCZK471BPA	Ceramic 470 pF 50V ±10%
C03,04	C1HFYK473APA	Mylar 0.047 μF 50V ±10%
	RESISTORS	
R01,02	R2CDZJ682APB	Carbon 6.8k 1/6W ±5%

L.E.D. P.C.B. Assy
131 0 4001 11900

Ref. No.	Parts Number	Description
CA01	131 0 4006 22265	Cord Assy
CA02	131 0 4006 22213	Cord Assy
S01	4 2312 05800	Keyboard Switch 7 mm (Phono)
S02	4 2312 05800	Keyboard Switch 7 mm (Tuner)
S03	4 2312 05800	Keybaord Switch 7 mm (Aux/CD)
S04	4 2312 05800	Keyboard Switch 7 mm (Tape)
S05	4 2312 05800	Keybaord Switch 7 mm (Synchro/Rec)
	CAPACITORS	
C01,02 03,04	C1ECZN103XPA	Ceramic 10000 pF 25V ±30%
C05	C1ECZN223XPA	Ceramic 22000 pF 25V ±30%
C06	CD1065000002V	Electrolytic 10 μF 50V
	SEMICONDUCTORS	
D01,02 03	DYY-SLR-54PT	L.E.D., SLR-54PT3 (Green)
D04,05	DYY-SLR-54VT	L.E.D., SLR-54VT3 (Red)
D06	202 5 1400 00120	Diode, GMA-01-4-BT
	RESISTORS	
R01	R2CDZJ104APB	Carbon 100k 1/6W ±5%
R02	R2HXBJ222A	Oxide Metal Film 2.2k 1/2W ±5%
R03	R2HXBJ152A	Oxide Metal Film 1.5k 1/2W ±5%
R04	R2HXBJ222A	Oxide Metal Film 2.2k 1/2W ±5%
R05	R2CDZJ102APB	Carbon 1k 1/6W ±5%

AC SWITCH P.C.B. Assy
131 0 4001 13140

Ref. No.		Parts Number	Description
		4 2352 00200	Fuse Clip
		4 2352 01170	Jack 7P
		4 2372 00830	EC Terminal 1P
F01,02	⚠	4 2349 20590	Fuse T 4.0 A
F03	⚠	4 2349 20250	Fuse T 2.0 A
L01,02		4 2552 00650	AF Coil 2.0 μH
S06	⚠	4 2312 05710	Switch Push Power
S07		4 2312 05820	Switch Push 1Key
		CAPACITOR	
C01		C2GYDP103A-S	Ceramic 0.01 μF 400V +100,–0%
		RESISTORS	
R01,02		R3DXBJ331A	Oxide Metal Film 330 2W ±5%
R05,06		R3AXBJ101A	Oxide Metal Film 100 1W ±5%

SPEAKER TERMINAL P.C.B. Assy
131 0 4001 13150

Ref. No.	Parts Number	Description
	4 2362 00840	Plug 4P
	4 2372 01160	Speaker 8P Terminal
	CAPACITORS	
C01,02 03,04 05,06	C1HFRM222A	Mylar 0.0022 μF 50V ±20%
C07,08 09,10	C1VRE-476A	Electrolytic 47 μF 35V

PRODUCT SAFETY NOTICE

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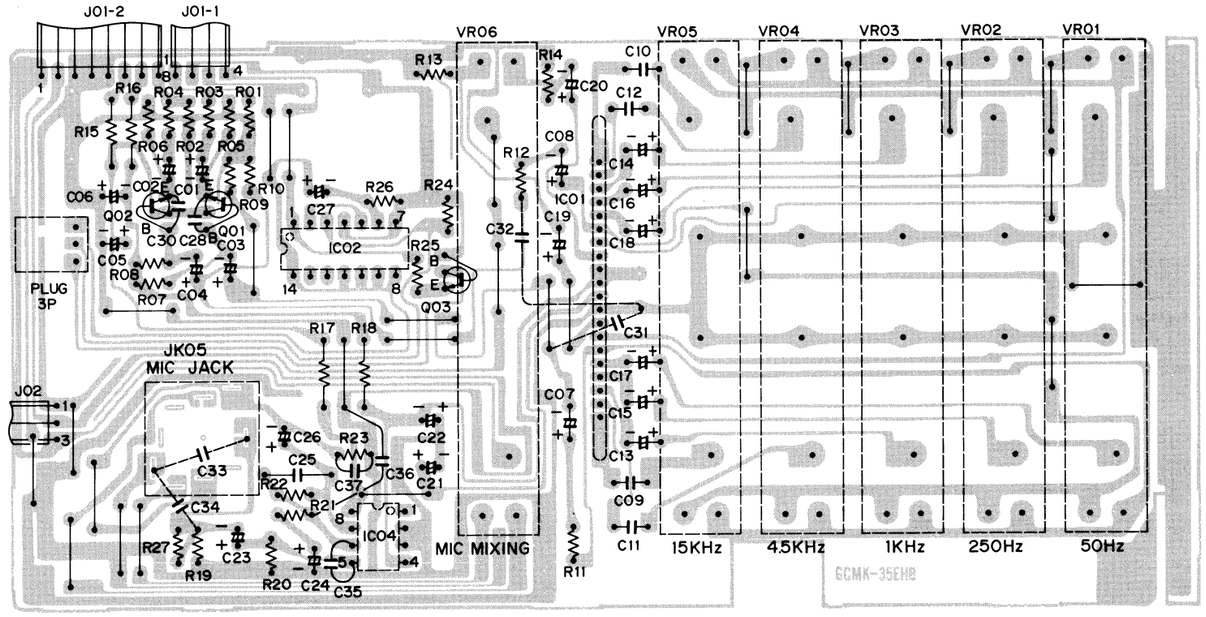
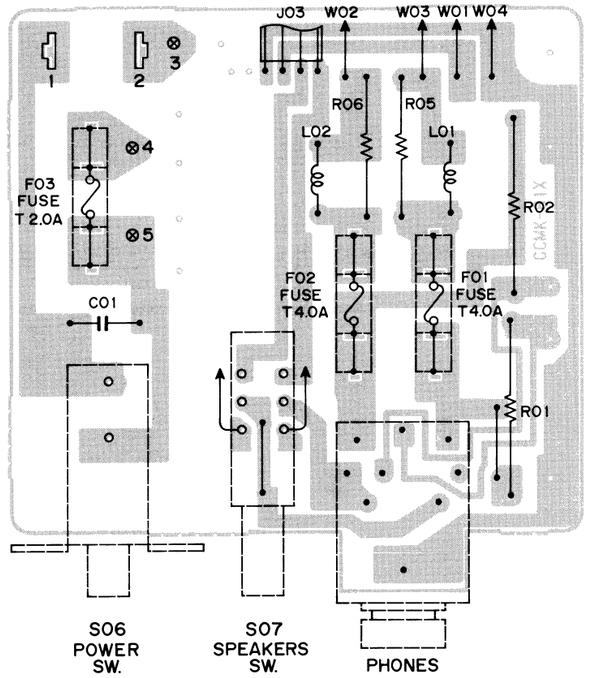
Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

GRAPHIC P.C.BOARD
(BOTTOM VIEW)

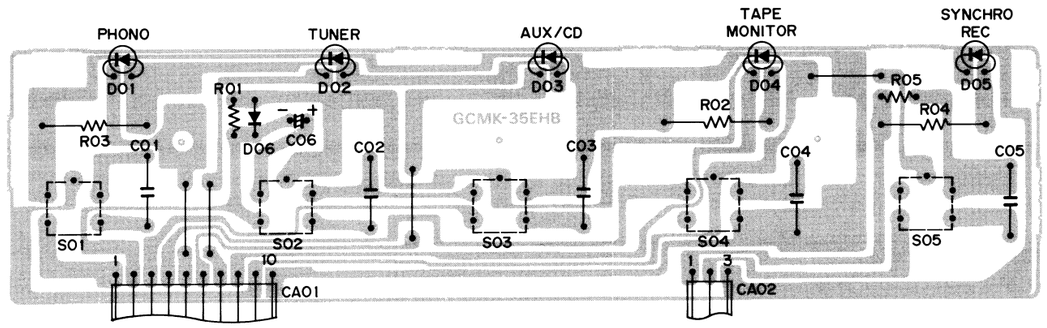


IC PIN NUMBERS DC VOLTAGES																					
SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
IC01	STK6328	–0.7V	–0.7V	–0.8V	–0.9V	–1.2V	–	–	–	0V	12.3V	–12.1V	–12.1V	–	–	–	–1.2V	–0.9V	–0.8V	–0.7V	–0.7V
IC02	LC4013B	11.4V	–11.5V	–	–11.5V	–11.5V	–11.5V	–11.5V	–	–	–	–	11.4V	–	–	–	–	–	–	–	–

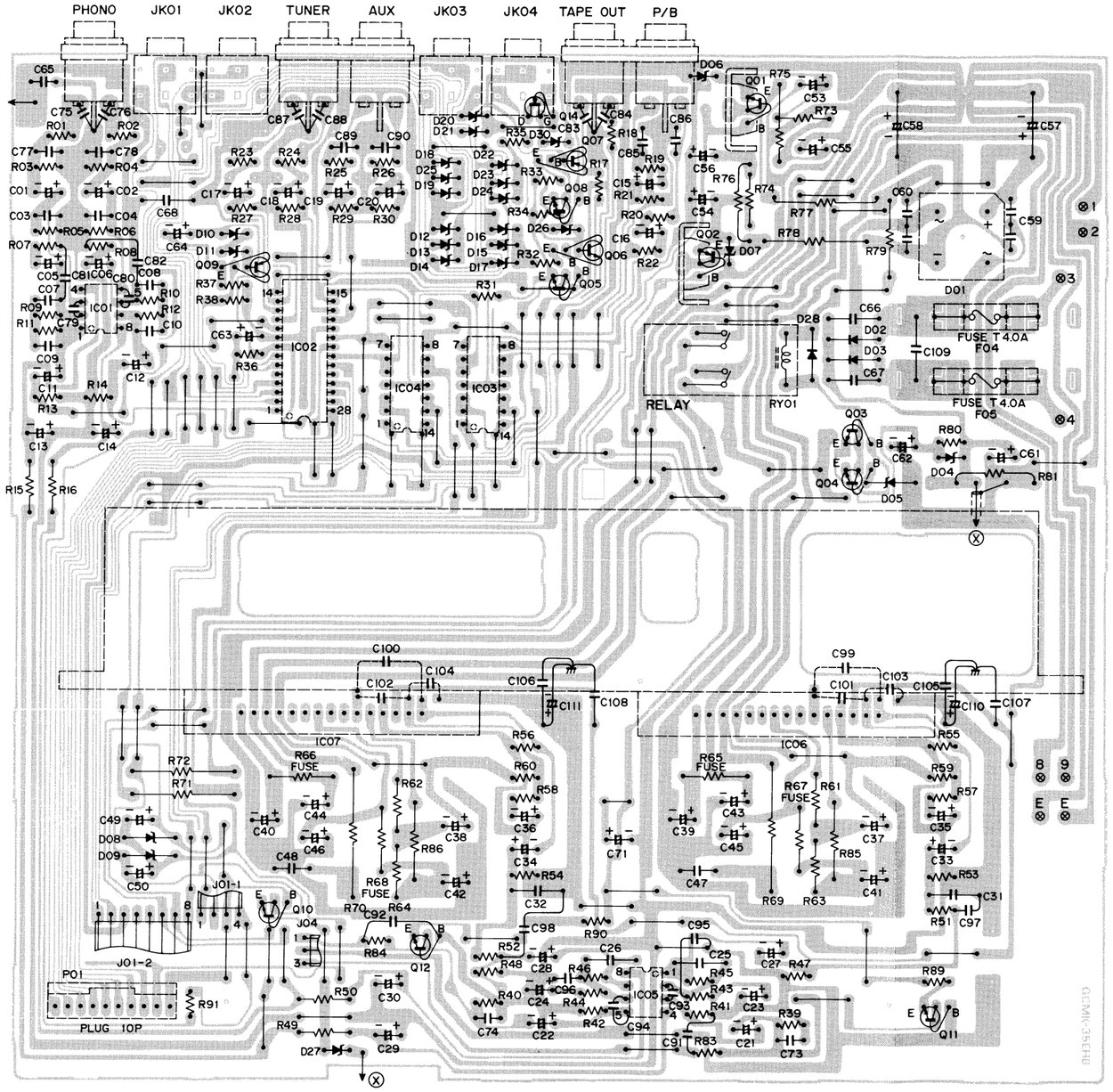
AC SWITCH P.C.BOARD
(BOTTOM VIEW)



L.E.D. PRINTED CIRCUIT BOARD
(BOTTOM VIEW)

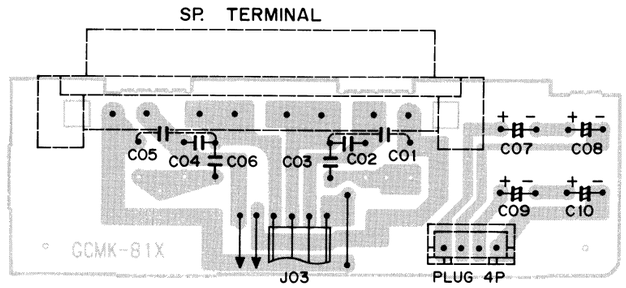


MAIN EQ PRINTED CIRCUIT BOARD
(BOTTOM VIEW)

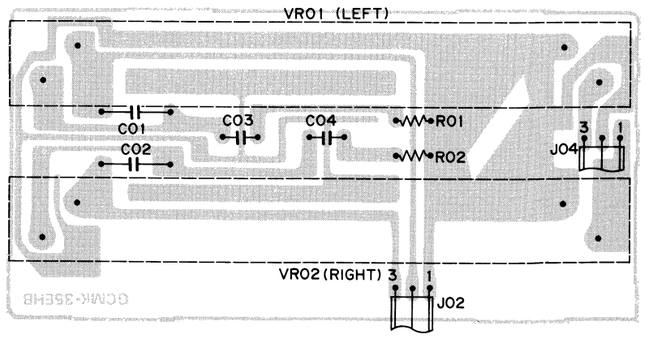


IC PIN NUMBERS DC VOLTAGES																
SYMBOL No.	DEVICE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
IC01	NJM072D	−7mV	1mV	−	−17.8V	−17.8V	1mV	1mV	17.8V	−	−	−	−	−	−	−
IC03,04	LC4066B	0V	4mV	4mV	4mV	11.4V	11.4V	−11.6V	−	0V	0V	4mV	−11.4V	−11.4V	−	−
IC05	NJM072D	10mV	3mV	3mV	−16.7V	3mV	3mV	10mV	16.8V	−	−	−	−	−	−	−
IC06,07	STK4036	−70mV	−66mV	−	−	−10.9V	−	−	−	−	−	−	−38V	−	38V	37V

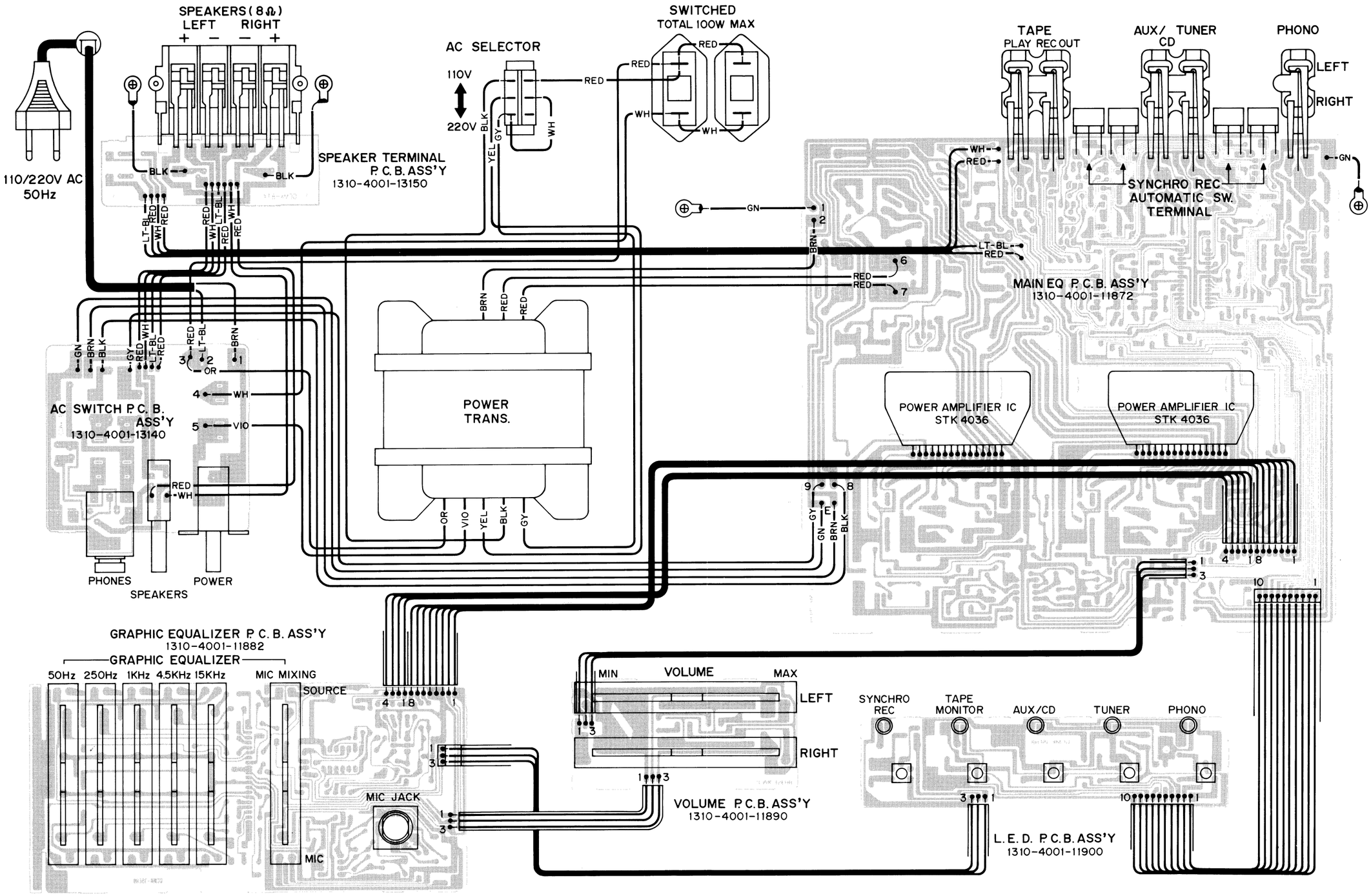
SP. TERMINAL P.C.BOARD
(BOTTOM VIEW)



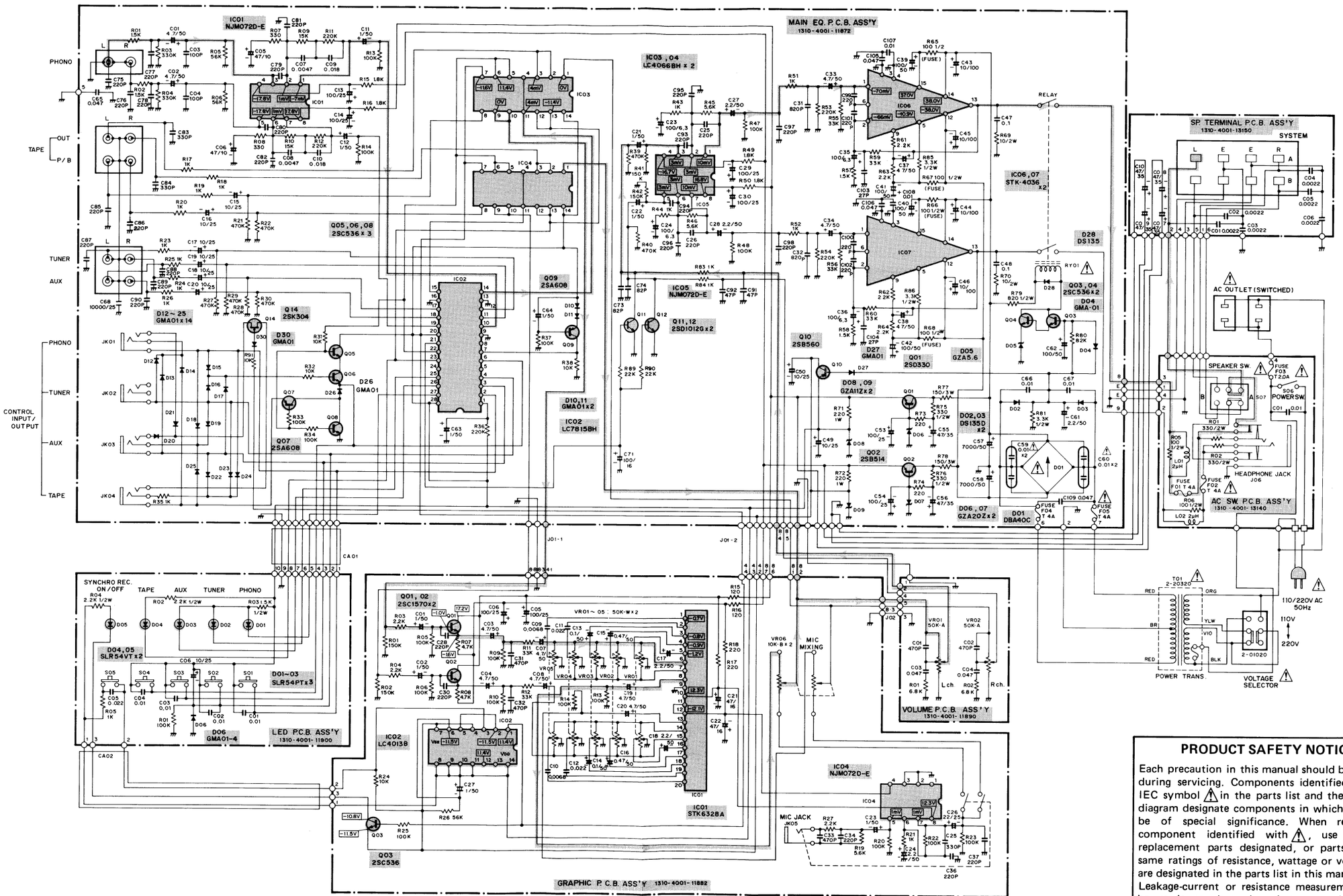
VOLUME P.C.BOARD
(BOTTOM VIEW)



POINT TO POINT WIRING DIAGRAM



SCHEMATIC DIAGRAM



NOTES:

1. All resistors values are indicated in "ohm" (K=10^3, M=10^6).
2. All capacitors values are indicated in "μF" (P=10^{-12}).
3. All voltages indicated on the schematics are measured under the following conditions.
   a. Use a V.T.V.M.
   b. All voltages ±10% with respect to chassis ground
   c. AC input at 220 volts 50 Hz
   d. FUNCTION SW: AUX
   e. Input Signal: 1 kHz (Sine-wave)
   f. Load Resistance: 8Ω
      Output: 18 W + 18 W (12.0 V)
4. This is a basic schematic diagram.

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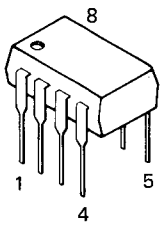
SEMICONDUCTOR LEAD IDENTIFICATION

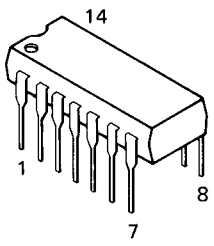
INTEGRATED CIRCUITS

PHONO/PREAMP MIC AMP IC



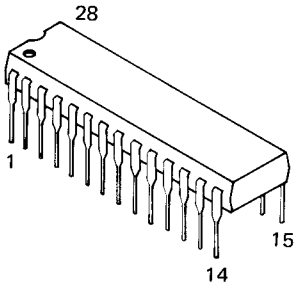
- NJM072D

TAPE SW IC (Quad Bilateral SW) DIAL D-TYPE FLIP-FLOP IC



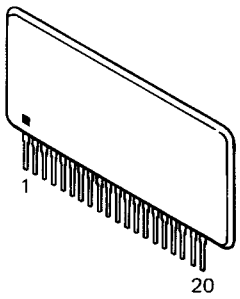
- LC4066B
- LC4013B

ANALOGUE FUNCTION SW IC



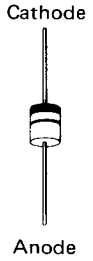
- LC7815H

GRAPHIC EQUALIZER IC



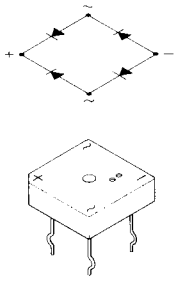
- STK6328A

DIODES



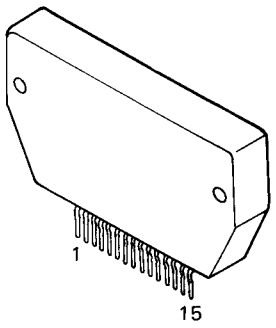
- DS-135D

- GMA-01
- GZA5.6X
- GZA11Z
- GZA20Z



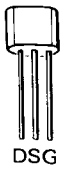
- DBA40C

POWER AMPLIFIER IC

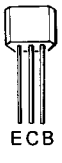


- STK4036

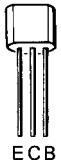
TRANSISTORS



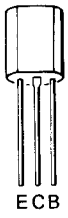
- 2SK330



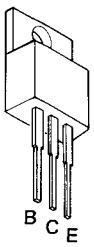
- 2SD1012



- 2SC536
- 2SC1570
- 2SA608



- 2SB560



- 2SD330
- 2SB514